

AFFECTED ENVIRONMENT

This section describes the area that could be affected by the alternatives being considered. The description is intended to present the information necessary to understand the effects of the alternatives that are presented in the environmental consequences section.

Air Quality

NPS has an affirmative responsibility under both the 1916 Organic Act and the Clean Air Act (42 U.S.C. 7401 et seq., Section 165) to protect its natural resources from the adverse effects of air pollution (42 U.S.C. 7401 et seq., Section 165). This act also established a national visibility protection goal to eliminate existing and prevent future visibility impairment in specially designated areas, known as Class I areas, in the United States. GTNP is a mandatory Class I area. NPS 2001 Management Policies directs the parks to seek the best air quality possible in order to “preserve natural resources and systems; preserve cultural resources; and sustain visitor enjoyment, human health, and scenic vistas.”

Most elements of a park environment are sensitive to air pollution, including vegetation, visibility, water quality, wildlife, historic and prehistoric structures and objects, and cultural landscapes. Not only is air quality important for the preservation of scenic, natural, and cultural resources, but it also affects visitor enjoyment and the health of employees and visitors. Air quality and visibility in the Moose area are generally excellent, although occasional periods of haze or smoke of local and interstate origins occur throughout the year.

Water Resources (Water Quality and Floodplains)

The affected environment considered for this project is initially limited to the site specific areas related to all facilities and systems associated with the visitor center, administrative buildings and the affected area within the vicinity of Moose, Wyoming. Consideration of cumulative effects of the proposed actions will require examination of additional areas.

Surface Water

The Snake River is the dominant surface water feature and, at the location of the project area, drains approximately 1664 square miles. The Wyoming Department of Environmental Quality has designated the Snake River above the town of Wilson, Wyoming as Class 1 - Outstanding Resource Water. No further degradation of these waters is allowed, with strict restrictions for avoiding all point source discharges. The developed area of Moose, Wyoming, in GTNP is located on the west bank of the Snake River about 25 miles downstream of Jackson Lake Dam. The valley floor of the Snake River tilts slightly to the west, causing a tendency for the river to migrate in that direction. For most of its length, the Snake River follows the pattern of a classic braided stream. However, in the area adjacent to Moose, flow is contained within a single channel. Roughly 800 feet on the west bank of the Snake River upstream from the Snake River Bridge is unstable. It is likely that the bank will continue to retreat during high flow events. This retreat will endanger the woody vegetation nearest the river, potentially denuding and further destabilizing the bank, threatening the nearby infrastructure of the Moose maintenance area, and impeding raft access to the boat ramps. Undercut banks present a safety hazard to persons near the river. Peak discharges in this watershed are produced by snowmelt in the spring with possible summer pulses resulting from thunderstorms. The hydrograph (a graph of streamflow vs. time) for the Snake River at Moose indicates a flow dampening effect of the flow regulation at Jackson Lake Dam. No other intermittent or perennial streams are presently mapped within the project area.

Ground Water

Ground water is recharged by infiltration of precipitation, streamflow leakage, irrigation water and inflow from other aquifers. Water-level contours indicate that ground water flows topographically from high areas toward the Snake River and southwest through the valley in the general direction of the river. The data indicate that the water quality of the alluvial valley aquifer is excellent, and therefore supports utilization for drinking water supplies, recreation, and other commercial uses. Much of the aquifer exhibits high permeability and significant interconnection to the rivers and lakes, making it vulnerable to contamination from the facilities, visitor use, and transportation corridors that exist in the recharge areas.

Floodplains

Floodplain maps produced by the Federal Emergency Management Agency (FEMA) (Report # 178) depict a portion of the existing visitor center and maintenance area within the 100-year floodplain. However, a recent floodplain analysis of the Moose area conducted by NPS Water Resources Division, concluded that the 100-year flood should be considered to be almost completely contained by the Snake River channel. The 500-year flood would exceed the channel capacity by roughly one to three feet, vertically. This study also examined the effects of two more extreme floods, the Probable Maximum Flood (PMF) and the dam-break flood. The depths and velocities associated with the 500-year flood are not considered to be great, and relocating “Critical Actions”¹ outside or above the flood level could mitigate the effects of such a flood.

Soils

The variety of soils found in the area result from the kinds and origins of the parent materials as well as variations in climatic conditions. The soils found in the project area are described in Table 3.

Table 3. Description of Soils found in the project area.

Soil Type	Description
Tetonville Complex	Nearly level soils on flood plains; seasonal high water table is 1-3 feet during May to July; surface runoff is slow, and the erosion hazard is slight.
Tetonville-Wilsonville	Fine sandy loams, nearly level soils in old braided stream channels in flood plains; seasonal high water table is 1-3 feet during May to July; surface runoff is slow and the erosion hazard is slight.
Tineman	Gravelly loam, very deep, well-drained soil along the Snake River; surface runoff is slow and the erosion hazard is slight.
Leavit-Youga Complex	Nearly level soils on alluvial fans and stream terraces; surface runoff is slow and erosion hazard is slight.
Previously disturbed soils	Existing developed zones where soils have been manipulated including roads, parking, buildings, and gravel areas. Soils in these areas are already severely compacted.

¹ Examples of Critical Actions include: a) Schools, hospitals, clinics, or other facilities occupied by people with physical or medical limitations; b) Fuel storage facilities, 40,000 gal/day or larger sewage treatment plants; and c) Irreplaceable records, museums, storage of archeological artifacts and emergency services.

Vegetation

The land cover types within the alternative construction sites are listed in Table 4.

Table 4. Description of vegetation types found in the project area (Mattson and Despain 1985).

Vegetation Type	Description
Aspen	Mature trees with even canopy and little mortality.
Cottonwood	Pole sized to mature trees with few conifers; understory of shrubs, grasses and forbs.
Sagebrush	Primarily big sagebrush interspersed with low sagebrush, rabbit brush, and antelope bitterbrush; understory of shrubs, grasses and forbs.
Spruce/Fir	Stands dominated by Engelmann spruce and subalpine fir in both overstory and understory; lodgepole pine, Douglas fir or whitebark pine may be present as minor stand component.
Human Development	Existing roads, parking and buildings; no affected plant communities.

Botanists conducted surveys for plant species of special concern throughout the affected area. They identified two species of special concern: large-flowered triteleia (*Triteleia grandiflora*) and narrow-petaled stonecrop (*Sedum stenopetalum*) (UW 1998) and (Markow 2001). Both plants are widespread in northwestern US but are at the edges of their ranges in western Wyoming. *Triteleia* was sparsely distributed within the sites for Alternatives C and E. *Sedum* was abundant on the sites for alternatives C and D with thousands of individuals present. No plants protected by the Endangered Species Act (ESA) have been recorded for the surrounding area.

The contractor who conducted the survey in 2001 also noted the presence of non-native species in the project area. Of the seven exotic species noted, two are classified as noxious: Canada thistle and musk thistle. Other exotic species present include smooth brome, orchard grass, Kentucky bluegrass, red-seeded dandelion, and common dandelion.

Wildlife

Grand Teton National Park provides habitat for a variety of wildlife species, including 61 mammals, 4 reptiles, 6 amphibians, 19 fish, and 299 species of birds (NPS 2000). Many of these could occur in the project area due to the diverse habitat mixture of woodland, riparian-wetland and sagebrush steppe communities present. Potential residents include ungulates (elk, moose, bison, mule deer, white-tailed deer, pronghorn), carnivores (coyotes, grizzly and black bears, gray wolves, mountain lions, bobcats, and lynx), rodents (beavers, muskrats, porcupines, marmots, ground squirrels, red squirrels, chipmunks, mice, and voles), and other small mammals such as bats, pine martens, river otters, badgers, and snowshoe hares. Numerous bird species, such as osprey, great blue herons, sandhill cranes, trumpeter swans, bald eagles, northern goshawks, owls, neotropical migrants and sage grouse, might use the area as well.

Most species of reptiles and amphibians that have been documented in the park occur along the valley floor and foothill regions (Koch and Peterson 1995). The leopard frog and the sagebrush lizard were rediscovered in the Park within the last 8 years and could be found in or near the project area. The Snake River cutthroat trout is the only native of 5 trout species found in the Snake River, which runs along or near the site alternatives. The Snake River cutthroat is a subspecies of the Yellowstone cutthroat trout. Currently a petition to list the Yellowstone cutthroat trout, including the Snake River subspecies, as a federally protected species is pending. Other fish in the Snake River include Rocky Mountain whitefish, suckers, minnows, and sculpins.

Species of Special Concern

The Wyoming Game and Fish Department (WGFD) classifies certain species as “Species of Special Concern” (WGFD 1997). These species are sub-divided into a range of priority groups. This is part of an evaluation system that was developed to categorize non-game species into priority groups according to their need for special management. The system evaluates a species’ distribution, population status and trend, habitat stability, and tolerance of human disturbance (WGFD 1986). Several of these species are potential residents of the project area or its surroundings.

Table 5. WGFD Species of special concern that may occur in the project area.

Common Name	Scientific Name	WGFD Status ¹
American White Pelican	<i>Pelecanus erythrorhynchos</i>	NSS3
Great Blue Heron	<i>Ardea herodias</i>	NSS4
Trumpeter Swan	<i>Cygnus buccinator</i>	NSS2
Peregrine Falcon	<i>Falco peregrinus</i>	NSS3
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	NSS4
Great Gray Owl	<i>Strix nebulosa</i>	NSS4
Veery	<i>Catharus fuscenscens</i>	NSS4
Water Vole	<i>Microtus richardsoni</i>	NSS3
Vagrant Shrew	<i>Sorex vagrans</i>	NSS3
Dwarf Shrew	<i>Sorex nanus</i>	NSS3
Long-eared Myotis	<i>Myotis evotis</i>	NSS2
Little Brown Myotis	<i>Myotis lucifugus</i>	NSS3
Long-legged Myotis	<i>Myotis volans</i>	NSS2
Big Brown Bat	<i>Eptesicus fuscus</i>	NSS3
Townsend's Big-eared Bat	<i>Plecotus townsendii</i>	NSS2
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	NSS3
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	NSS3
Northern Goshawk	<i>Accipiter gentilis</i>	NSS4
Orange-crowned Warbler	<i>Vermivora celata</i>	NSS4

¹ WGFD Status:

NSS2 = Populations restricted or declining in numbers and/or distribution; extirpation in Wyoming is not imminent AND ongoing significant loss of habitat.

NSS3 = Populations restricted or declining in numbers and/or distribution; extirpation in Wyoming is not imminent AND habitat is restricted or vulnerable but no recent or on-going loss; species is sensitive to human disturbance.

NSS4 = Species is widely distributed; population status and trends within Wyoming are assumed stable AND Habitat is restricted or vulnerable but no recent or on-going significant loss; species is sensitive to human disturbance.

Trumpeter swans are of particular interest because there has been a long-term decline in the year-round resident Tri-State-Flock sub-population. A recent petition for listing them as threatened or endangered (Biodiversity Legal Foundation and Fund for Animals 2000; USFWS 2000) has been submitted, but no action on the petition has been taken to date. Over-winter survival has decreased because of suspected competition for marginal winter range with a migratory Canadian flock, and low recruitment is being investigated.

Another species of concern is the sage grouse (*Centrocercus urophasianus*). Historically found throughout the western United States and southern Canada, sage grouse numbers have declined dramatically since the 1950's. Reasons are unknown but habitat changes are thought to be the primary cause. However, despite little change in sagebrush habitat within the park since surveys began in the 1940's, local declines have been significantly greater than those in other areas.

Threatened and Endangered Species

Grand Teton National Park contains five species of vertebrates listed under the Endangered Species Act (ESA) as threatened, endangered, or experimental. The whooping crane is listed as experimental non-essential, the bald eagle, Canada lynx, and grizzly bear as threatened, and the gray wolf as endangered/experimental (NPS 2000).

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was federally listed as an endangered species in Wyoming in March 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001) and was re-listed in 1978 under the ESA of 1973 (43 FR 6233). The Pacific States Bald Eagle Recovery Team was formed in response to the 1978 listing, and a recovery plan was completed in 1986 (FWS 1986). Grand Teton National Park lies within the Greater Yellowstone Recovery Area (Zone 18 in the Recovery Plan). Because of the implementation of recovery plans, bald eagles began to increase by the mid-1980s. Consequently, the status of the bald eagle changed to threatened in Wyoming on July 12, 1995 (64 FR 35999 36010). Recovery goals were subsequently met, and in July 1999 the USFWS announced a proposal to remove the bald eagle from the endangered species list. No final action has occurred to date. The bald eagle, besides being a "species of special concern" in the park, is also afforded protection under the 1918 Migratory Bird Treaty Act (16 U.S. Code 703), and the 1940 Bald Eagle Protection Act (16 U.S. Code 668).

Between 1970 and 1995 the bald eagle population in the Greater Yellowstone Area increased exponentially (Stangl 1999). This growth was attributed to a significant reduction in the level of environmental contaminants such as DDT, and the protection of nesting habitat (Stangl 1999).

GTNP contains 10 known nesting territories and pairs; however, not all pairs nest in the park each year. Known territories are located along the shorelines of the Snake River and Jackson Lake. In the park, the Snake River and adjacent riparian area is used by as many as six pairs of eagles for nesting and foraging. Bald eagles that nest along the Snake River may remain on their nest territories throughout the year, occasionally leaving for short periods during the non-breeding season to exploit abundant or ephemeral food sources elsewhere. Eagles feed primarily on fish, waterfowl, and carrion.

Bald eagle management in the park involves annual nest surveys, seasonal area closures around bald eagle nest sites to protect them from human disturbance, and monitoring of annual nest territory occupancy and productivity. Seasonal area closures usually occur from February 15 until August 15, and involve a 0.5-mile buffer zone around active bald eagle nests to provide protection from human disturbance.

Nest building or repair intensifies in early February, and egg laying occurs in late March or early April, followed by a 35-day incubation period (Swensen et al. 1986; Harmata and Oakleaf 1992; Strangl 1994). Most nesting territories are located along major rivers or lakes within 5 km of their inlets or outlets, or along thermally influenced streams or lakes (Alt 1980). Nests and roosts commonly occur in mature and old growth trees in multi-layered stands of Douglas fir (*Pseudotsuga menziesii*), black cottonwood (*Populus trichocarpa*), and spruce (*Picea* spp.) Nearby food, suitable perches, and security from human activities are important habitat components for both nest and roost sites.

Two bald eagle nests are located within 2 miles of the project area. Neither of these nests is located within 0.5 miles of an alternative construction site in this EA.

Canada Lynx (*Lynx canadensis*)

The Canada lynx was first proposed for listing as a threatened species under the ESA in July of 1998 (63 FR 36993 37013). In doing so, USFWS concluded that the lynx population in the United States was threatened by human alteration of forests, low numbers as a result of past exploitation, expansion of the range of competitors (particularly bobcats and coyotes), and elevated levels of human access into lynx habitat (63 FR 36994). A final ruling on March 24, 2000 listed the lynx as a threatened species (65 FR 16051 16086).

In Wyoming, the lynx has been protected as a non-game species with no open season since 1973 (NPS 2000b). The State of Wyoming classifies the lynx as a Species of Special Concern-Class 2, which indicates that habitat is limited and populations are restricted or declining (NPS 1998).

Lynx are solitary carnivores generally occurring at low densities in boreal forest habitats, with their distribution and abundance closely tied to that of the snowshoe hare (*Lepus americanus*), their primary prey. However, this relationship may be muted or absent in more southern populations (Halfpenny et al. 1982). In Wyoming, lynx occur primarily in spruce-fir and lodgepole pine forests at slopes of 8° and 12°, at elevations between 7,995 and 9,636 feet (USFS 1999). However, aspen (*Populus tremuloides*) stands and forest edges may also be important. Potential Canada lynx habitat areas for Grand Teton National Park have been identified based on these general habitat preferences. While none of the alternative site locations for this project are within this area, all are within 0.10 miles of potential lynx habitat (NPS 2000).

Little information on lynx abundance and distribution is available for GTNP. Park records include only 12 reports (GTNP wildlife observation files), some of which may not be credible because lynx are easily confused with bobcats. A snow-track transect survey of 169 km at nine locales in northern GTNP and vicinity in 1998 found no sign of lynx (S. Patla, Wyoming Game and Fish Department, pers. com. 2000). Recent attempts to determine if lynx are present in the park were made using hair snares, but no hairs from this species were detected during the first year (August 2000) of a three-year survey (S. Pyare, Wildlife Conservation Society, pers. com. 2001). Although the lower elevation (~6445) at the proposed site alternatives and flat terrain provide only marginal lynx habitat, a credible sighting of a lynx near the Murie ranch cabins occurred in 1992, approximately 0.5 miles from the project area (GTNP wildlife observation files).

Grizzly Bear (*Ursus arctos horribilis*)

Grizzly bear management within GTNP is governed by the park's *Human-Bear Management Plan* (NPS 1989) and the Interagency Grizzly Bear Guidelines (USFS 1986, hereinafter referred to as the "Guidelines"). The Guidelines were developed in an effort to provide effective direction for the conservation of grizzly bears and their habitat among the federal agencies responsible for managing land within the recovery zone. They were submitted to the U.S. Fish and Wildlife Service for formal consultation as required by 50 C.F.R., Sec. 402.04, which resulted in a Biological Opinion that stated "It is our opinion that implementation of the Guidelines will promote conservation of the grizzly bear." The Interagency Grizzly Bear Committee (IGBC) subsequently approved the application of the Guidelines on federal lands throughout grizzly bear ecosystems in Idaho, Montana, and Wyoming. Specifically, the park's objectives for managing grizzly bears are to:

- restore and maintain the natural integrity, distribution, and behavior of grizzly bears
- provide for visitors to understand, observe, and appreciate grizzly bears
- provide for visitor safety by minimizing bear/human conflicts, by reducing human-generated food sources, and by regulating visitor distribution.

Grizzly bears have increased from relatively uncommon to common in Grand Teton National Park during the last 10 years, in conjunction with a steady trend toward increasing bear density in the southern GYA. Grizzly bears are now common in the Gros Ventre Mountains on the southeastern border of Grand Teton National Park, and southeast to the upper Green River basin. In the Teton Range, they are regularly sighted north of Moran Canyon and the Badger Creek drainage, where visitor use of the backcountry occurs at relatively low levels. On the Jackson Hole valley floor, they are common north of the Triangle X ranch, and have been observed south of there in the Snake River drainage on several occasions. Home ranges of 27 radio-collared bears from 1975–1998 have included parts of GTNP and/or the John D. Rockefeller, Jr. Memorial Parkway. Grizzly bear-human conflicts in the park have included human injuries and maulings, nuisance bears associated with unsecured human foods and garbage, and livestock depredations.

Approximately 125,000 acres of Grand Teton National Park lie within the grizzly bear recovery zone. Despite the fact that the project area is outside the recovery zone's southern boundary, it is situated within the Snake River riparian area, which has been documented as a bear travel corridor. Tracks were found in the Beaver Creek housing area in the winter of 2001, approximately 2.0 miles northwest of the project area. Grizzly bears have also been sighted in the Death Canyon area and near Teton Village. Both locations are less than 10 miles from the project area. Hence, grizzly bears could be found in any part of the park.

Gray Wolf (*Canis lupus*)

The gray wolf was first listed as an endangered species on March 11 1967 (32 FR 4001). The subspecies of the northern Rocky Mountain wolf (*Canis lupus irremotus*) was initially listed as an endangered species in 1973 (38 FR 14678). Due to taxonomic concerns, the entire species was listed as endangered in the contiguous United States outside of Minnesota, where it was listed as threatened in 1978 (43 FR 9607). In 1990 Congress directed the appointment of a Wolf Management Committee to develop a plan for wolf restoration in YNP and central Idaho. The following year, Congress directed the United States Fish and Wildlife Service (USFWS) to prepare an EIS to consider the reintroduction (USFWS 1994a).

The final EIS was completed in May 1994. The final rules for the introduction were published in November of 1994, in which the gray wolf was reclassified as experimental, non-essential (59 FR 60252 60266), experimental according to section 10(j) of the ESA of 1973, as amended (16 U.S.C. 1531). In national parks and wildlife refuges, nonessential experimental populations are treated as threatened species, and all provisions of ESA Section 7 apply (50 CFR 17.83(b). All wolves occurring in the State of Wyoming are classified as nonessential experimental (59 FR 60256). This designation allows the Fish and Wildlife Service to remove wolves that prey on domestic animals.

First released in Yellowstone National Park in March 1995, individuals from this experimental population began to disperse into GTNP in 1997, and established the park as part of their home range during the 1998-99 winter season. Three groups have used areas within the park from Pacific Creek to the National Elk Refuge and the Gros Ventre River basin, and wolves have been sighted within one or two miles of the project area. Wolf packs now occur throughout the central GYA, including areas north and east of the parks. In 1998, wolf pack territory sizes averaged 359 square miles (range: 135 to 955 square miles) (Smith et al. 1998). Depending upon prey abundance, wolves in Grand Teton may occupy a variety of habitats including grasslands,

sagebrush steppes, coniferous and mixed forests, and alpine areas. Ungulates are a primary food source, at times accounting for more than 90% of the biomass consumed by wolves. During snow-free months, smaller mammals are an important alternative food source (USFWS 1994). Habitat for both ungulates and smaller mammals occurs in the project area.

Whooping Crane (*Grus americana*)

Whooping cranes are considered as rare summer migrants in northwest Wyoming, and do not nest in the park. From 1978 through 1995, there were 12 documented observations in the Snake River corridor (GTNP wildlife observation files). Whooping cranes primarily use marshes or riverine habitat for both foraging and roosting during migration (USFWS 1994b). Although this type of habitat exists in GTNP, no critical habitat for Whooping Cranes has been delineated within the boundaries of the park. No suitable summer whooping crane habitat exists in the alternative site locations.

Health and Safety

Building Safety

The Moose area is located within an area of significant seismic activity. In 1998, a report was prepared to evaluate the potential earthquake-related risk to human life. The report followed the guidelines set forth in the Federal Emergency Management Agency (FEMA report number 178: National Earthquake Hazards Reduction Program (NEHRP) Handbook for the Seismic Evaluation of Existing Buildings. The NEHRP Handbook defines a design seismic event as "ground motion which has a 10% probability of being exceeded in 50 years" (SATO and associates 1998). FEMA modifies the seismic coefficient to result in an equivalent force based on mean ground motion occurring during such an event. This report is the second step in meeting the requirements of Executive Order 12941 that requires federal agencies to evaluate and mitigate seismic hazards in their owned and leased buildings.

The seismic evaluation report, Seismic Evaluation: Moose Visitor Center Grand Teton National Park (Sato and Associates 1998), concludes that the present wall system of the headquarters/visitor center building is incapable of reacting to the lateral forces which would be generated in a major earthquake. Three primary deficiencies were noted:

- The exterior walls contain a large number of window openings
- Attic draft stops that were intended to transfer shear loads from the roof to internal walls were not constructed according to the original plans.
- A major interior shear wall has been removed to expand exhibit space.

Motor Vehicle and Pedestrian Safety

Twenty-eight motor vehicle accidents (MVAs) have been reported in the Moose area from 1997-2000. The most common type of accidents in the Moose area was simple backing accidents occurring primarily in parking lots. Of the 28 MVAs reported in the last five years, nine accidents were of this type. Other accidents reported in order of highest occurrence are: collisions at the Moose entrance station (7); collisions at the US Highway 191 junction (5); collisions at the Moose-Wilson Road and Teton Park Road intersection (3); vehicle vs. deer or elk (2); and other (2) (NPS Case Incident Activity Reports, 1997-2000).

Visitor Experience

Access and Circulation

Access to the Moose area is provided by one primary, US Highway 191, and 2 secondary roadways: the Moose-Wilson Road and the Teton Park Road. US Highway 191 extends south

form Moran Junction to the south boundary of Grand Teton NP providing access from Jackson, Wyoming (See figure 1). The Teton Park Road traverses the eastern edge of the Teton Range between Moose Junction and Jackson Lake Junction. The Moose-Wilson Road is a narrow lightly traveled roadway without shoulders, that extends southwest from the Moose visitor center to the southwest entrance station and to Teton Village and Wilson, Wyoming. A small portion (approximately 6%) of summer traffic enters Moose from the Moose-Wilson Road.

Grand Teton National Park performs visitor counts at various locations within the park that indicate the travel patterns in and through the Moose area. Counts were administered at the Moose Entrance, the Moran Entrance, Gros Ventre Junction and US 89 westbound. These counts were tallied monthly and total figures for the last five years for each road segment are provided below.

Table 6. Vehicle counts for Grand Teton National Park roadways.

Year	Moose Entrance Northbound	Moose Entrance Southbound	Gros Ventre Junction Northbound	89 West Southbound	Moose-Wilson
1996	281,289	252849	1097972	312731	102356
1997	283,640	221545	1274822	277813	90523
1998	303,415	326270	1263070	283780	139617
1999	235,475	262240	1322302	285147	123626
2000	283,805	312215	1286916	275134	167052

Moose Area Circulation

Because the maintenance and park headquarters buildings share the same access roads with the housing area, daycare center, visitor center and boat and fishing parking, vehicle traffic can be congested and confusing. The circulation proves to be particularly confusing to the 59% of visitors who are visiting the park for the first time.

Park Visitation

Annual visitation has increased steadily in Grand Teton National Park from 1990 to 1999. In 2000, the park experienced a 5% decrease in annual visitation. Figures for the first 5 months of 2001 indicate a 4% increase in visitation over visitor use numbers from the same months of 2000. The table below provides the annual visitation statistics for the years 1990 to 2000.

Table 7. Annual visitation to Grand Teton National Park.

Year	Annual Visitation	Year	Annual Visitation
1990	2,680,747	1996	4,037,627
1991	2,862,158	1997	4,060,150
1992	3,012,465	1998	4,118,106
1993	3,531,556	1999	4,160,303
1994	3,761,400	2000	3,942,099
1995	3,856,414		

Park Visitors

Visitors to Grand Teton National Park have been the subject of several sociological studies in years past. In 1987, and again in 1997, Visitor Service Project (VSP) studies were done in the park during the summer season. During the winter of 1995 - 1996 a special VSP study was conducted in conjunction with Winter Use Planning. In 1998, the Visitor Service Card (VSC) study was begun as a part of the Government Performance and Results Act. The VSC study is conducted annually during one week in mid-July. The park has results from these studies for the 1998, 1999 and 2000 seasons.

Some study results are applicable to the Moose Visitor Center or its location. The two VSP studies show 36% of surveyed park visitors use the Moose Visitor Center in the summer, while 44% use the Moose Visitor Center in winter. These results are confirmed by the VSC studies annually that show 93% of visitors used a visitor center (there are four visitor or information centers) and 94% of visitors sought out and used park employees as an information source. During the winter, 54% of visitors seek out park employees for assistance. For a large percentage of visitors, a stop at a visitor center makes up a significant part of their park experience.

For survey questions about what activity visitors engaged in, the results changed between 1987 and 1997. The tables below summarize the top 5 most popular visitor activities for 1987 and 1997. These activities reflect the kinds and types of questions that are routinely answered at the Moose Visitor Center. Those common questions relate to pleasure and scenic driving, wildlife viewing, access to shopping and general trip planning.

Table 8. Top five summer visitor activities in 1987.

Activity	% Participating
Visiting a visitor center	59%
Stopping at roadside exhibits	48%
Shopping	47%
Hiking for under two hours	41%
Picnicking	30%

Table 9. Top five summer visitor activities in 1997.

Activity	% Participating
Viewing scenery	98%
Viewing wildlife	88%
Pleasure driving	71%
Stopping at roadside exhibits	59%
Shopping	38%

Visitors arrive in the park from many different points of origin. The five states most frequently represented in the VSP of 1997 are summarized in table 10 below.

Table 10. States with the highest summer visitation.

State	Percent of Summer Visitation
California	11%
Texas	6%
Utah	6%
Colorado	6%
Florida	5%

Visitors from Wyoming make up less than 3% of total park visitation tied for eighth place with New York, Illinois, Arizona, Michigan and Idaho. In winter, the states with the highest visitation are represented in table 11 below.

Table 11. States with the highest winter visitation.

State	Percent of Winter Visitation
Wyoming	26%
Idaho	11%
California	9%
Utah	7%
Colorado	5%

The need to provide park visitors with orientation and information about the park is an important element in visitor enjoyment and safety. It is critical that visitor services be located and designed so that facilities are easy to locate and use.

Over one half (59%) of the visitors to the park are visiting for the first time. 73% are family groups and 66% of visitors are using a family vehicle. These figures are consistent between the two major VSP surveys. These same visitors are predominantly northbound from Jackson (53%), as compared to southbound from Yellowstone (36%). For the majority of visitors, making a stop at the Moose Visitor Center is their first contact with the National Park Service in the greater Yellowstone area.

The Moose area is the fourth most-frequently visited place, behind Jenny Lake, the Snake River, and Colter Bay. Of the most commonly used visitor services and facilities, the Moose Visitor Center ranks fourth at 36%, behind the park brochure (92%), other free brochures (45%), and roadside exhibits (42%). Of the four visitor or information centers in the park, Moose is the most-visited. The number of visits to the visitor center for the years 1995 through 2000 are summarized in Table 12.

Table 12. Moose Visitor Center visitation 1995-2000.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95	4769	5418	6176	6957	24848	59553	85706	79284	54544	19600	*3165	*1246
96	*3214	5572	6516	5678	24483	57729	82182	85022	50358	17120	3349	4252
97	4908	4851	7103	4896	24067	55502	80844	79524	52171	16637	4047	4421
98	3460	3024	4074	6632	25597	43993	92916	152539	62036	17126	3291	2749
99	3618	3548	4097	3821	18013	39083	80655	49736	44559	18426	4240	3534
00	3700	4798	4963	5905	23386	52689	71210	65027	39264	14508	3244	2588

*Government Closure

The Visitor Center

The function of the Moose Visitor Center has changed dramatically since its roof collapsed in the winter of 1984-1985. The exhibit space has been reduced by 50%, and the space dedicated to book sales has increased by nearly 100%. While visitation has increased from 1.4 million in 1961 to 4.16 million in 1999, the number of drinking fountains and restroom facilities has remained the same. The lobby space has been reduced by the installation of an entry vestibule and a second information desk to accommodate the backcountry permit operation.

The visitor center also contains a Grand Teton Natural History Association (GTNHA) bookstore with annual sales of approximately \$1,000,000 displaying approximately 900 titles. The GTNHA employs 25 people, several of whom operate in and around the Moose Visitor Center.

During the summer season, 18 additional employees work at the Moose visitor center and spend portions of each day at the facility.

Visitor Services and Activities

Travelers entering Moose have the opportunity to engage in several activities. Visitors may stop in at the visitor center; stop in at float trip parking to meet a fishing or float trip; visit the Moose Store or post office; or, by invitation or prior arrangement, drive to The Murie Center. Visitors may also walk or drive to the nearby Chapel of the Transfiguration or Menor's Ferry.

Services or programs currently available at the visitor center include information, orientation, backcountry permitting and trip planning and informational exhibits. In the winter, snowshoe walks begin at the visitor center. The event meets indoors and then continues outdoors on two paths leading out from the visitor center, either north or south along the river.

Two rangers and one GTNHA sales clerk staff the information desk in the visitor center. During busy times, which are generally late morning through about 3 PM, a uniformed ranger is needed as an extra sales clerk. The backcountry permit registration area is the busiest service in the visitor center during the morning hours, with two uniformed rangers working two computer terminals. The line at the permit desk often crosses the lobby and waits of about 20 minutes are common. Lines at the information desk can be long with visitors typically waiting several minutes for service.

By late morning, the lobby can often reach a temperature of 83 degrees, even with the air conditioning functioning. At those times, it is necessary to open all the doors, shut off the air conditioning, and allow the building to ventilate through both the front and back doors. This condition usually arises in July and continues through August.

During the summer, the South District seasonal interpretive staff of 20 uses the visitor center as their duty station. Presently, space allocated for seasonal operations is limited, as is space for parking, preparation of programs, breaks, and accommodation of personal items needed during the day's work.

Natural Soundscapes

Year-round, programs conducted within the vicinity of the visitor center, including those headed north to Menor's Ferry or south along the river for a snowshoe walk, are affected by the sound of air traffic. During the summer months, or at those times when windows are open, meetings in the administrative portions of the building can be similarly interrupted. Throughout the course of a year approximately 35,100 flights land and take off from the Jackson Hole Airport. Daily activity at the airport averages 96 operations per day. The airport has a preferential runway use program that directs air traffic to runway 18 whenever wind conditions permit. This is because the use of runway 18 has the least effect on the soundscape of Grand Teton National Park. The alternate runway at the Jackson Hole Airport, runway 36, is used for approximately 15% of the airport's daytime operations and 3 to 5% of nighttime operations. The flight path for runway 36 crosses directly over the Moose Village area, and follows the Snake River corridor on the eastern edge of US Highway 191.

Other noticeable sources of man-made sound in the Moose area include the sound generated by automobiles, busses, large trucks, motorcycles and maintenance activities. Average A weighted sound levels (measured at 50') for busses traveling over pavement at 40 MPH is 76 dBA. The average A weighted sound levels, as measured at 50' for automobiles and vans is 68 dBA. Audibility is the ability of a person to detect specific sounds in presence of naturally occurring background sound. Audibility is a function of the type of terrain, atmospheric conditions, ground service, and the sound level and frequency (HMMH 2001).

Table 13 represents an average distance to the limit of audibility for automobiles and busses in both open and forested terrain. The measurements listed below are generalized for vehicles that are traveling at an average of 40 MPH. Generally, the decibel level for vehicles traveling slower would be lower and higher for vehicles that are accelerating. The amount of sound produced by a moving vehicle is also affected by the surface of the travel-way. For example, vehicles traveling on a snow-covered surface are somewhat quieter than vehicles traveling on a hard or paved surface. Analysis of average sound level permits an evaluation of the average loudness of the noise from vehicular traffic.

Table 13. Distances to the limits of audibility for individual vehicle pass-bys of automobiles and busses in open and forested terrain (HMMH 2001).

Vehicle Type	Maximum 50' Pass by Level (dBA)	Distance to Limit of Audibility (feet)			
		Open Terrain		Forested Terrain	
		Average Background	Quiet Background	Average Background	Quiet Background
Automobile	68	2,180	2,330	1,130	1,200
Bus	76	5,520	6,090	2,620	2,860

Data are not available to describe the exact number of and time of day that vehicles travel through the Moose area. The vehicle counts for the Moose entrance station provide the best available information related to the numbers of vehicles that pass through the Moose area. In 2000, 283,805 vehicles were counted through the Moose Entrance Station heading north and 312,215 vehicles were counted through the Moose Entrance Station traveling south. Empirical data suggest that

during the summer months a steady flow of traffic moves through the Moose area in the daylight hours.

Visual Quality

The regional landscape of the Jackson Hole area is comprised of sagebrush flats and steep mountain terrain. The Bridger-Teton National Forest, Grand Teton National Park, the National Elk Refuge and privately owned lands contribute significantly to the natural scene. These scenic resources are among the most spectacular in the western United States and are a primary reason for the region's popularity as a tourist destination.

The towering granite peaks of the Teton Range are the dominant scenic attribute of Grand Teton National Park. The range, a notable example of fault-block topography, presents a high alpine environment. Glacial cirques, glaciers, high angle canyons, tumbling streams, and a series of lakes are found here. The Snake River terraces are covered with a mix of open sagebrush, conifers and deciduous trees. Meandering through the valley's foreground in a southwest direction is the Snake River providing a rich riparian habitat for the wildlife of the area. Vegetation is diverse because of climate and topography. Sagebrush dominates the porous flatland of the valley floor. The morainal ridges are wooded with bands of cottonwoods and willows lining meandering courses of the Snake River and its tributaries.

The project area is located in the Snake River riparian zone amongst large stands of conifers, deciduous trees and sagebrush flats. The Moose development area contains the visitor center and park headquarters building, employee housing, a large maintenance facility, the post office and associated parking areas. These facilities are clearly visible from the Teton Park Road. There are no formal pedestrian circulation routes within the Moose area. The lack of defined walkways has resulted in multiple social trails around the visitor center and through the roadside islands leading to the Moose Post Office. There is no visual or physical separation between the maintenance areas and visitor use areas. This results in visitors wandering through maintenance and administration areas in search of visitor services. These factors contribute to the disturbance and removal of vegetation and are frustrating and confusing to park visitors.

Unobstructed views into the Moose employee housing area exist from the Teton Park Road. No screening of the maintenance structures and housing is present.

Travel routes of primary importance are US Highway 191, Teton Park Road, Moose/Wilson Road and The Chapel of Transfiguration Road. The project area is visible for long periods from these four travel routes. US Highway 191 and the Teton Park Road have a high volume of traffic.

Travel Routes and Viewpoints

Viewpoints of primary importance include travel routes and areas of high visitor use. The criteria for determining which views are most important include those areas which have national importance or those areas of the project area that are visible to a moderate or large number of viewers. The amount of time a proposed action can be seen is also an important aspect of assessing effects on visual resources. This is because the longer a management activity is in view the more likely it is that it will be noticed or have an effect on the viewer. This effect is somewhat mitigated by the expectations of individual viewers. For example, increasing the footprint of an already developed area may have less of an effect on the overall viewshed than adding development in an area where none has existed before.

The analysis of visual quality assesses impacts from the following travel corridors or viewpoints.

Table 14. Travel routes of primary importance.

Travel Route	Criteria
1. US Highway 191	High use, views of long duration
2. Teton Park Road	High use, views of long duration
3. Snake River	Moderate use
4. Moose-Wilson Road	Moderate use, views of long duration

Table 15. 1997-2000 Highway counters (3-year average).

Moose Entrance Northbound	Moose Entrance Southbound	Gros Ventre Junction Northbound	89 West Southbound	Moose-Wilson Road
277,525	275,024	1,249,017	286,921	124,635

Travel Routes of Primary Importance

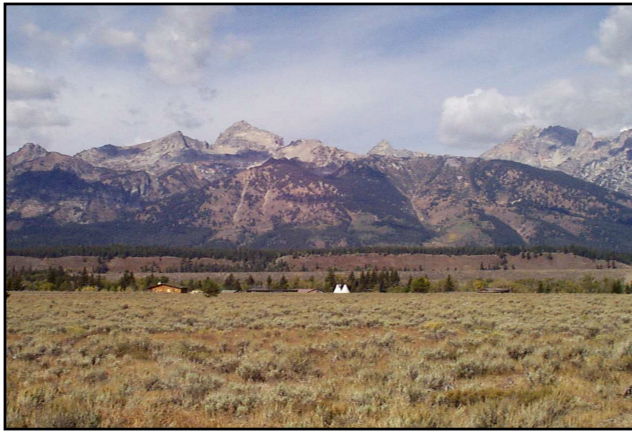
Travel Route #1: US Highway 191

Deemed a “Scenic By-way” and “Historic Route of the Overland Stage Route-Original Pony Express,” US Highway 191 is a main artery through the park. The average number of vehicles traveling northbound on US Highway 191 is 1,249,017 vehicles; southbound traffic accounted for an average of 286,921 vehicles.



US Highway 191 looking west

As visitors drive through Moose junction, the project area is in view for 1 minute 3 seconds at an average speed of 55 to 45 mph. Views from US Highway 191 are high quality, but not unique to other locations throughout the park.



US Highway 191 looking west toward Dornan's

Travel Route #2: Teton Park Road

The Teton Park Road intersection is an important viewpoint for visitors turning west towards Moose. This allows visitors to approach the mountain range head on rather than from the side. The Teton Park Road invites park visitors to experience the base of the mountains and lakeshore of the high alpine lakes. Traffic through the Moose Entrance heading north accounted for 277, 525 vehicles. Southbound vehicles through the Moose Entrance totaled 275, 025. The project area is visible from this travel route for duration of 2 minutes 52 seconds at 25 to 35 mph.

The area of analysis for this viewing area starts above the Snake River floodplain, extends through Moose and includes views of the Snake River.

Travel Route #3: Snake River

This viewpoint is a high visitor use access area for fishing and boating on the Snake River. In 2000, concessioners landed 4631 rafts in Moose carrying 47,183 passengers and 235 rafts launched from Moose carrying 2393. In addition, in 2000, 762 private boats landed carrying 1512 passengers and 421 boats launched carrying 840 passengers.

Viewpoint #4: Moose-Wilson Road

This viewpoint is a high activity area in Moose. This area contains the Moose Post Office, the Moose Village Store and the entrance to The Murie Center. The Moose- Wilson Road is a secondary entrance into Moose. In the summer traffic on the Moose-Wilson Road accounts for 6% of the total vehicles on park roads in the summer. The road connects to Granite Entrance and meanders 8 miles through the riparian corridor to the intersection with the Teton Park Road. An average of 124,635 vehicles travel the Moose-Wilson Road annually.



Teton Park Road looking southwest toward Moose-Wilson Road

Visitor Services

Moose Village Store

The Moose Village Store is located next to the post office at Moose, and is owned and operated by Grand Teton Lodge Company. The store carries a selection of gifts, souvenirs, clothing, convenience items, snack foods, and camping and fishing equipment. The store also sells fishing licenses and serves as the fishing headquarters for Grand Teton Lodge Company. All of Grand Teton Lodge Company's guided river trips are booked through the store and guides meet their clients there. A snack bar with outside seating closed several years ago. There are no public restrooms at the store. Two employee apartments for concessions staff (a two-bedroom and a one-bedroom) are attached to the store.

The Moose area has had a store and tackle shop since the 1920's. The Carmichael and Mosley families operated a tackle shop that moved to the location of the existing Moose Village Store when the new bridge was put in across the Snake River and the highway was realigned in 1965. A gas station, located on the opposite side of the post office, was removed in 1996.

Grand Teton Lodge Company reported gross revenue from the Moose Village Store of \$231,586 in 2000. Revenue from guided fishing trips accounted for \$120,000 of that amount. In 1999, the store grossed \$191,000 with \$72,000 from guided fishing trips.

River and Fishing Concessions

The following float or fishing companies use the Moose Landing to either launch or land:

Barker-Ewing Scenic Tours
Boy Scouts of America
Crescent H Ranch
Fort Jackson Float Trips
Grand Teton Lodge Company
Heart 6 Float Trips
Jack Dennis Fishing Trips
Lost Creek Ranch

National Park Float Trips
OARS, Inc.
R Lazy S Ranch
Signal Mountain Lodge
Solitude Float Trips
Triangle X-Osprey Float Trips

In 2000, 4631 rafts landed at Moose carrying 47,183 passengers and 235 rafts launched at Moose carrying 2393 passengers. Also in 2000, 762 fishing boats landed at Moose carrying 1512 passengers and 421 fishing boats launched at Moose carrying 840 passengers.

Adjacent Facilities

Other commercial facilities and services in the Moose Village area are owned and operated by Moose Enterprises, Inc. (Dornan's) on 20 acres of private lands located within the park. This family owned business has been in operation since 1941. Facilities include a bar, liquor store, grocery store, gift shop, seasonal outdoor restaurant, rental cabins, gas, bicycle rentals, and other retail outlets.

Although originally located along the Moose-Wilson Road in the Huckleberry Springs area, the post office relocated in 1929 to Menor's Ferry where the community soon constructed a log school and The Chapel of the Transfiguration. During the 1920s the Bureau of Public Roads constructed a highway from Jackson to Menor's Ferry, erecting a steel truss bridge to span the Snake River. The road and bridge precipitated the construction of some modest tourist facilities such as a small gas station and trading post, as well as a combined tackle shop and post office. In 1958, the National Park Service moved its park headquarters to the Moose area, where new construction associated with the "Mission 66" development program was occurring. The realignment of the Teton Park Road in the early 1960s placed the majority of this development north of the entrance road. By the early 1970s the businesses were again located on the south side of the park road. Today, a small store built around 1958 and a post office constructed in 1976 constitute all that remains of this development.

Cultural Resources

Archaeological Resources

Although less than 10% of the lands within Grand Teton National Park have been surveyed, previous archaeological surveys within the park and on adjacent lands suggest a seasonal settlement pattern for the Jackson Hole area. Compared to other national parks, such as those in the American Southwest, the archaeology of Jackson Hole is less visible to the average visitor. However, it represents the successful adaptation of Native Americans to the region's relatively harsh climate and rugged environment.

Early Native American people made their living by hunting animals and gathering roots, bulbs, berries, and seeds. Thus, their economy has been characterized as "hunting and gathering," but this existence cannot be further characterized as "simple." Only well-adapted and complex cultures could make a living in such a challenging environment. The park's prehistoric sites represent a wide range of plant, animal, and stone procurement locations, seasonal camps and plant processing features that represent more than 10,000 years of human use in Jackson Hole.

Over the past decade two archaeological surveys have been conducted in and around the land proposed locations for the new visitor center. In 1990, the National Park Service's Midwest Archaeological Center conducted a survey of the Moose developed area. In 1998, archeological

surveys were conducted on three large parcels of land roughly corresponding to alternative visitor center locations. These surveys were of a reconnaissance nature, designed to provide an indication of the type and number of archaeological sites likely to be found in these locations. The surveys suggest that few prehistoric or historic archaeological sites exist within Alternatives B, C, D, and E visitor center locations near Moose. The scarcity of archaeological sites may be related to settlement, construction, and development activities that have occurred in these areas over the years.

Existing Post Office and West of the Post Office Area

One large historic trash scatter (48TE1482) and two prehistoric sites have been identified in this area. One prehistoric site consists of a small ephemeral lithic scatter (48TE398). The other prehistoric site (48TE1483) consists of miscellaneous lithic debris. The survey team hypothesized that the site was used only once for lithic procurement.

The historic trash scatter (48TE1482) contains several hundred artifacts, including glass, metal, and ceramic fragments. The archaeologists also identified several rectangular concrete foundations, possibly associated with the former Moose general store and gas station, which the National Park Service removed in 1958. The building site proposed in Alternative C is bisected by an old road alignment that diverges from the Moose-Wilson Road and leads directly to the current Moose kiosks.

A recent archaeological inventory of the Moose Post Office area was conducted by the park archaeologist. The survey located 3 historic pits, 1 foundation, 2 abandoned roadways, and some isolated historic debris; all are most likely associated with early homesteading in the area. One obsidian corner notched projectile point was located. In addition one prehistoric lithic scatter was located adjacent to the Murie Ranch road, however, it lies outside the proposed project area.

Because of the reconnaissance nature of the archaeological surveys cited above, additional research and fieldwork will be needed to determine the way in which these sites are associated to the area and their eligibility for listing in the National Register of Historic Places.

Southeast Snake River Location

A recent University of Wyoming archaeological survey identified one previously unrecorded site (48TE1484), an historic trash scatter. The archaeological site contains several hundred artifacts, some dating to the 1920s. The historic archaeological site may be associated with the homestead of Earl Harris. In 1912, Harris homesteaded 171 acres south of Menor's Ferry, along the east bank of the Snake River. Five years later, after receiving his homestead patent, Harris raised 30 acres of barley and wheat, which produced 18 tons of hay. Like his neighbor to the north, Holiday Menor, Harris probably dry-farmed his land (Daugherty 1999).

Ethnographic Resources

Archaeological and ethnographic evidence indicate that Native Americans used the Jackson Hole area, including the present-day park as early as 8,000 to 10,000 years ago. While archaeological and historic preservation laws address archaeological property concerns, these laws do not adequately protect or take into consideration other cultural values or traditions held in modern times. The American Indian Religious Freedom Act of 1978 and the Native American Graves Protection and Repatriation Act of 1990 defined and strengthened the rights of Native American Indians and clarified the responsibilities of federal agencies regarding these types of cultural resources. The park is further required to identify and address Native American Indian concerns through consultation with individual tribal governments.

Historic Structures

Settlers, many of who traversed Teton Pass from Idaho, began homesteading the Moose area around the turn of the 20th century. William D. Menor was the first to occupy lands on the west

side of the Snake River, erecting a small log cabin in 1894. Although his ferry operation consumed much of his time, “Bill” Menor found time to construct an irrigation system, erect a barn, shed, storeroom, shop and ice-house and to fence his 148-acre homestead. Others soon followed. William Grant homesteaded 160 acres below Sawmill Ponds in 1914. Looking to supplement his income, Grant eventually opened a grocery on his land. His income received a modest boost in 1923, when the store began doubling as the Moose Post Office.

By 1923, the Moose Post Office provided mail to several nearby homesteaders, notably Holiday Menor, Maud Noble, Evelyn Dornan, Buster Estes, Alice Bladon, Leonard Altenreid, and Al Young. Young operated a sawmill near a marshy area, which soon became known as Sawmill Ponds. Around this same time Buster Estes met and married Frances Mears, and the couple operated the STS Dude Ranch until after World War II, when they sold the ranch to the Murie brothers, Olaus and Adolph, and their respective wives, Mardy and Louise. The Murie family discontinued the dude ranching operations, and the structures soon served as the unofficial western headquarters of the Wilderness Society during Olaus Murie’s tenure as director of that organization.

Several historic structures and complexes either listed in or determined eligible for listing in the National Register of Historic Places are located within one mile of the study area. The Murie Ranch Historic District (48TE1143) is located one-half mile southwest of the Moose Post Office. This ranch, consisting of 20 rustic log and frame structures, is associated with the lives and careers of Olaus and Mardy Murie. Olaus began his career as a field biologist with the U.S. Biological Survey, distinguishing himself for his pioneering scientific studies of caribou and elk. Both he and Mardy later became avid conservationists. Olaus Murie accepted the position of Executive Director of the Wilderness Society in 1945. The historic Moose Entrance Kiosk (48TE984) is located several hundred yards northwest of the study area and is situated immediately east of the Moose entrance station. The kiosk is regarded as a “textbook” example of the National Park Service rustic style of architecture.

The Menor’s Ferry historic complex (48TE901) is located about a quarter-mile northeast of the Moose Visitor Center. The historic complex of ten historic structures includes the replica Snake River ferry associated with early Jackson Hole settler Bill Menor. The complex also encompasses the Maud Noble cabin (48TE925), where National Park Service officials and local landowners formulated the “Jackson Hole Plan,” which led to the eventual creation of Grand Teton National Park. Finally, The Chapel of the Transfiguration (48TE1043) is located immediately west of Menor’s Ferry historic complex. The historic chapel was constructed in 1925 to serve employees and guests of the nearby dude ranches. The log structure is an excellent example of the Arts and Crafts movement.

Museum Objects

The existing Mission 66 Visitor Center currently has fifteen large, catalogued oil paintings, highlighting several of the park’s natural resources, on exhibit along the upper portion of the walls of the lobby area. The current exhibit lacks appropriate temperature, relative humidity, and particulate controls necessary for the long-term display and preservation of such objects as outlined in the Museum Handbook.

Economic Environment

Local and Regional Economy

Grand Teton National Park is in northwest Wyoming in the center of Teton County. Teton County has an estimated population of about 18,251 persons (2000). State and federal government entities manage 97% of its land area. Despite accounting for less than 3% of the state's population in 1998, nearly 6.5% of the statewide employment was in Teton County. More

dramatically, construction jobs in the county accounted for nearly 12% of statewide construction employment and local jobs counted for nearly one of every 10 statewide jobs in finance, insurance and real estate. Both of these sectors are particularly sensitive to the pace and level of development.

In Teton County, the average per capita personal income in 1998 was \$52,723, the highest in the state. However, income sources in the local economy differ markedly from statewide and national averages and suggest that many local households may not enjoy the high standard of living suggested by the high per capita income figures. The largest economic sectors, by earnings, were services (at 38% of the county total), retail trade (14.6%), finances, insurance, real estate (10.8%), and construction (15.2%). The earnings of people employed in Teton County increased from \$144,030,000 in 1985 to \$510,400,000 in 1998, an average growth rate of 11.5 %.

Grand Teton National Park attracted more than 2.68 million recreational visits in 1999, the 28th highest visitation in the national park system. Attracted by the exceptional scenic, wildlife and outdoor recreation opportunities throughout the region, high visitor volumes to the area have caused tourism, including seasonal and second home use, to become the dominant economic influence in Teton County's economy.

Park Operations

Facilities

Existing facilities in the Moose area include 36 housing units that provide a total of 100 bedrooms. The Moose Visitor Center and Headquarters building is a one story building of lightwood frame construction. Completed in 1961 it has a floor area of 10,951 square feet. The building is divided into two major sections: the main wing, roughly 96 feet by 80 feet that houses the displays and visitor center, along with restrooms and a few offices. The east wing, roughly 120 feet by 38 feet, houses the parks administrative offices. There are a total of 26 office spaces in the administrative wing, as well as a conference room, a copy room (with an office unit), three equipment rooms, staff restrooms, and a book sales stock room. Within these spaces, approximately 37 permanent employees work. During the peak summer season, there are up to 200 office workers in the administrative buildings. The Moose Visitor Center may have up to 3200 people enter the building in a peak day.

The maintenance building includes 10 offices, a carpenter shop, vehicle repair bays, a meeting room and storage. The first floor of the maintenance building is 29,548 square feet. The second floor that is currently under construction is 16,832-square feet excluding a storage mezzanine.

Utilities

Water supply for the Moose and Beaver Creek developments is from two wells near Taggart Creek. Either well is capable of delivering over 500-gals/per minute and the current peak use is only about 50 gals/min during July. The water system is regulated as a public water supply, number PWS 5680093. The only treatment for the water is chlorinating. Drinking water parameters are tested as required by State and Federal regulations. The water system includes a 250,000-gal water reservoir for fire protection.

The Moose area is served by an extended aeration wastewater treatment plant with discharge to a percolation field located southwest of The Chapel of the Transfiguration. The 1973 design flow is 57,000 gal/day and the actual flow is less than 16,000 gals/day in the peak summer months. In April 2000, a Class V injection facility permit was obtained from the State of Wyoming for the underground wastewater discharge. A permit to modify an existing wastewater system will be required as part of the design process for a new visitor center.

Lower Valley Energy is the local electricity provider for the Moose area. Telephone service is provided to the Moose area by Qwest.

Social Environment

The social environment is characterized by identifiable groups of people who express opinions, attitudes and beliefs about the proposed action. A sample of these characteristic expressions was obtained through comments received from the public in response to scoping for this proposed action. These expressions are typically grouped based on “communities of interest” who tend to react in predictable ways to proposed actions, and who advocate for certain outcomes when decisions are made. In this case, the public comment was not distinctly different by communities of interest. The following characterization facilitates an assessment of how controversial the different alternatives might be using a population that has directly expressed an interest.

While there was nearly unanimous support for new visitor facilities, there were some differences in the preference for their location. Public opinion was divided evenly between support for reconstructing the visitor center in its existing location (alternatives A and B) and the two proposed locations on the south side of the Teton Park Road (alternatives C and D). Local governments and citizenry alike voiced strong opposition to any construction on the east side of the Snake River (alternative E).

Adjacent Lands

Land Use

When Congress established the current Grand Teton National Park in 1950, the boundary described by the legislation included private, state, county and federal lands. When a park is established, the legislation defines the boundary, and any private land in that boundary remains private until acquired by NPS. Currently, there are 3483 acres of non-federal land in the park. Of this non-federal land, 2103 acres are privately owned. This land is divided between 117 different land parcels, ranging in size from 0.04 acres to 1106 acres. Four of these parcels, encompassing 1126 acres, are protected by conservation easements. In addition to these private lands, over 1366 acres of land in the park are owned by the State of Wyoming, and close to 13 acres are owned by Teton County. There are 20 privately owned parcels located within a 5-mile radius of any of the site alternatives. Two parcels are undeveloped, and the rest are used for residential purposes.

Private lands within the vicinity of the study area are The Murie Ranch, the 4 Lazy F Ranch and the Dornan's area.

ENVIRONMENTAL CONSEQUENCES

Assumptions, Methodologies and Terminology for Evaluating Impacts

This section contains the scientific and analytical foundation for comparison of the effects (the word “effect” is used interchangeably with “impact”) of the alternatives, where the alternatives are designed to define issues sharply and provide a clear basis of choice. Described are the possible impacts of each alternative on the natural, cultural, and social and economic environments, in accordance with the impact topics identified in the Purpose and Need section

For each impact topic this chapter first explains the methods and assumptions used for all impact topics. Then for each alternative it discloses direct and indirect environmental effects for the range or resource impact topics including effects on the human environment (social, safety and economic). The analysis includes a description of whether effects are beneficial or adverse and short or long term. The magnitude of the effect also is described in terms ranging from negligible to major. Effects disclosed may be direct or indirect. The definition of the level or magnitude of the impact may vary between impact topics so individual definitions are provided for each.

Definition of the Level of Effect

For the rest of the analysis, including Natural Resources, all disclosed effects are considered short-term unless otherwise stated. In most cases the duration of the impact coincides with the duration of the action.

Direct and indirect effects are described in terms of type (beneficial or adverse: noted impacts are adverse unless stated otherwise), context (site-specific, local, or regional), duration (short- or long-term) and intensity (negligible, minor, moderate, or major). Cumulative impacts are considered separately as defined below.

The thresholds of change for the intensity of an impact may be defined as follows:

Short-term:	the effects last five years or less
Long term:	the effects last more than five years
Negligible:	the effect is at the lower levels of detection
Minor:	the effect is slight but detectable
Moderate:	the effect is readily apparent
Major:	the effect is severely adverse or exceptionally beneficial
Impairment:	the effect is major and adverse, impacting a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; identified as a goal in the strategic plan or other relevant NPS planning documents.

Cumulative Effects

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions (40 CFR 1508.7). The general methodology used in determining cumulative impacts is this: for each resource of concern (subject to cumulative impacts) select a geographic area of influence; within the area of influence determine other sources of impact on the resource of concern; determine the additive impact of other sources of concern along with the impacts of

the proposed or alternative actions. Depending on the resource, both the area of influence and the sources of impact can be different. This analysis is oriented primarily to potential impacts on physical and biological resources. A clear premise in the cumulative effects analysis is this: if it is demonstrated that there are no direct or indirect effects from a proposed action or alternative, or if impacts are negligible, then there is no additive impact from the action. Potential cumulative impacts are disclosed in a section separate from and following direct and indirect effects.

Impairment of Park Resources or Values

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (*Directors Order 55: Interpreting the National Park Service Organic Act*) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.
- Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

EFFECTS OF ALTERNATIVES

The Effects of the Alternatives on Air Quality

Methodology

All information available on the air resources within Grand Teton National Park was compiled. The relationship of existing sources of pollution to the ambient air quality of the project has not been sufficiently studied to assess the impacts quantitatively. Consequently, air quality impacts associated with vehicle emissions, fugitive dust, and construction activities were assessed qualitatively.

Table 16. Definition of impacts to air quality.

Impact Category	Definition
Negligible	The impact on air quality is not measurable or perceptible.
Minor	The impact on air quality is measurable or perceptible and is localized with a relatively small area.
Moderate	The impact is sufficient to cause a change in exposure, but is localized. The change is measurable and perceptible but could be reversed.
Major	The impact is substantial, highly noticeable and may be permanent.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

The Effects of Alternatives A through E on Air Quality

The level of impact on air quality will depend on the duration of construction activity in the short-term. Air quality will be affected by dust and vehicle emissions from the construction of the proposed new facility. During dry periods, fugitive dust from construction would periodically increase airborne particulate matter near the project area, but particle concentrations would be minor. Hauling material and operating equipment during the construction period would also increase local vehicle emissions. Construction-related traffic delays and idling vehicles would also slightly increase emissions. These emissions would likely be dissipated quickly since air stagnation is rare in this area. None of the alternatives analyzed would cause a measurable reduction in the regional visual range.

Cumulative Impacts

The area of concern in respect to air resources consists of the Moose development area and the area visible from Moose west and north into the park. At times air quality and visibility will be severely affected by smoke from wildland fires, including prescribed burns, prescribed natural fires, and wildfires that occur in the surrounding area. Air pollutants originating from regional and local sources, from the anticipated growth in the Jackson Hole area, and from increasing park visitation could also add to air quality impacts. Emissions caused by the proposed actions would be short-term and have a negligible additive effect on the overall air quality in the park compared to other pollution sources.

Conclusion

Short-term effects will be minor and adverse on the overall air quality in the park compared to other pollution sources. The majority of the emissions will be short-term impacts due to construction, consisting mostly of dust and combustion products of construction equipment. Conservation of air quality is necessary to fulfil the essential purposes of the park and its enjoyment, and to meet state and federal laws or other requirements. Because the impacts described in the alternatives would be minor and short-term, there would be no impairment of air quality values.

The Effects of the Alternatives on Water Resources

Methodology

All available information on water resources within the scope of the project has been compiled. This information includes a recent floodplain analysis and a 1998 Water Resources Scoping Report (Technical Report NPS/NRWRS/NRTR-98/154).

Impacts to surface water and ground water are defined at various levels described in the table below. Consideration of impacts and their disclosure is a function of risk, intensity, duration and extent. Actions were evaluated for potential delivery of pollutants and proximity to water resources.

Table 17. Definition of impacts to water quality.

Impact Category	Definition
Beneficial effect	An action that serves to improve water quality as compared to existing conditions.
Negligible or no effect	An action that is a low risk of degrading water quality because of sufficient separation between the action and conveyance routes to the resource, or because the action does not generate sources of impact harmful to water resources.
Minor effect	An action that could represent a low risk of degrading water quality, by proximity to surface water, involving non-toxic or nonpoint and minor sources of pollution that do not persist in the environment.
Moderate effect	An action that could represent a moderate risk of degrading water quality by proximity to surface water, involving sources of pollution that are persistent in the environment and may be toxic to aquatic biota but which are local in extent.
Major effect	An action that could represent a high risk of degrading water quality by proximity to surface water, involving sources of pollution that are persistent in the environment and may be toxic to aquatic biota beyond the local area.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

Impacts to floodplains are defined at various levels described in the table below.

Consideration of impacts and their disclosure is a function of risk, intensity, duration and extent. A preliminary floodplain assessment, based on overlays of floodplain delineation maps, was conducted to determine if the proposed activity had a chance of being located in applicable regulatory floodplain. If there was no chance of being located in the applicable regulatory floodplain, then there were no further requirements of NPS Special Directive 93-4. A floodplain

analysis was conducted by the National Park Service, Water Resources Division, using standard hydrologic and hydraulic methods to determine flood hazard parameters within the Moose area.

Table 18. Definition of impacts to floodplains.

Impact Category	Definition
Beneficial Effect	An action that removes “Critical Actions” from locations within regulatory floodplain.
Negligible or No Effect	An action that is not located in the 100-year, 500-year or extreme floodplain.
Minor Effect	An action that may be located in the extreme floodplain.
Moderate Effect	An action that may be located within the 500-year floodplain.
Major Effect	An action that may be located within the 100 year floodplain.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

Regulations and Policies

Generally, the actions related to the maintenance, repair or renovation (but not full reconstruction or expansion) of currently serviceable facilities or structures that were under construction or completed prior to May 28, 1980 are granted an exception from the Statement of Findings requirement. This exception would allow for minor (0.1 acres or less) deviations in the structure’s configuration or footprint due to changes in construction codes or safety standards.

The Effects of Alternative A on Water Resources

Impact Analysis

The location of the current visitor facility, partially within the 500-year floodplain, represents an existing impact or a potential for impact on both water resources and on the structure and its contents.

Surface Water and Ground Water

The existing visitor center, maintenance buildings, parking and storage currently occupy approximately 9 acres of impervious surface. Minimal, short-term construction related activities associated with this alternative have the potential to produce non-point source pollution in the form of soil erosion, equipment fluid leakage, etc. This alternative presents a moderate risk of degrading water quality due to its proximity to the Snake River. Mitigating measures (see Mitigation - above) would help protect these resources from sediment and other deleterious material. This alternative would not cause any increases in the area contributing to storm water runoff.

Floodplains

According to the requirements of NPS Special Directive 93-4, if there is a chance that the proposed action is in the applicable regulatory floodplain (as determined by a preliminary floodplain assessment), then it is necessary to determine the class of the proposed action and which of three regulatory floodplains applies. The No Action Alternative would be considered a Class II Action. A Class II Action includes actions that contain irreplaceable records, museums, storage of archeological artifacts, and emergency services. The regulatory floodplain for a Class II Action is the 500-year floodplain.

Implementing this alternative would result in the continuation of existing conditions and trends. The NPS WRD floodplain analysis determined the Moose visitor center developed area to be located partially within the 500-year floodplain. The existing visitor center/administrative building itself is shown to be located outside the 500-year floodplain. The maintenance facility is totally within the 500-year floodplain, which would also be the regulatory floodplain for this structure (emergency services are located there). Additionally, a fuel storage shed, a water treatment plant, and the park library are within the 500-year floodplain boundaries.

The existing boat launch area is subject to intensive use. This location is subject to both streambank erosion and gravel buildup. A temporary permit allows minor dredging to continue at the launch site. In 1998, a study was conducted by the Bureau of Reclamation to develop bank stabilization recommendations for the area of the Snake River located between the bridge and Menor's Ferry. This study indicated that there is considerable bank instability in the project area. Additional data would be required to evaluate the feasibility of maintaining a boat launch at this location due to the effects of continued bank instability.

Cumulative Impacts

Water quality in the Snake River adjacent to the Moose area is potentially at risk from this proposed action. Water quality at this river segment is a function of all upstream influences associated with a very large drainage area, but is characterized as being of high quality. The "no action" alternative, and alternative B, represent the largest risk to water quality by virtue of the site location within the 500 year floodplain. The risk would be relative to effects that might occur as a consequence of the presence of structures in the event of a flood whose recurrence interval is 500 years. Other alternatives would locate the visitor center outside the 500-year floodplain and not subject to this flood event. On the basis of the amount of flow in the Snake River, and the extent of the watershed above Moose, any short-term, mitigated impact of construction would not detract measurably from existing water quality. All such construction would occur outside and well away from the riparian zone, where no gravity-assisted means exists to route erosion products into the river. Existing water quality in the Snake River at Moose would be regarded as an index to the total cumulative sources of impact in the drainage above that point. No additional activities are proposed that would measurably affect groundwater in a cumulative context. There are no impacts on wetlands in any of the alternatives; therefore there is no additive impact on wetlands as an ecological resource in the park.

Conclusion

Water resources would be subject to moderate effects by this alternative. Mitigating measures (see Mitigation above) would help protect these resources from sediment and other deleterious material. This alternative would not cause any increases in the area contributing to storm water runoff.

Floodplains would be subject to moderate effects, when considering the entire Moose developed area (includes visitor center, maintenance buildings and boat launch area). Relocating "Critical Actions" outside or above the flood level could mitigate the effects of a 500-year flood. For instance, irreplaceable artifacts could be stored in waterproof containers and/or upper floors. Fuel storage sheds could be relocated outside or above the estimated floodplain. The water treatment facility could be flood-proofed or made resistant to the 500-year flood stage.

If property used by the general public is located in an identified flood hazard area, the responsible agency is required to provide conspicuous delineation (on structures, and other places where appropriate) of past and probable flood height in order to enhance public awareness of and knowledge about flood hazards (EO 11988). Based on NPS guidelines, no mitigation is required for extreme or dam-break flood events. However, preparation for such disasters should be

considered due to the risk of human life. To guard against these potential floods, an agreement of prompt notification should be established between the Bureau of Reclamation and the park. An evacuation plan for Moose should also be developed.

Conservation of watershed values is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect watershed values, particularly with the mitigation described, there would be no impairment of watershed resources or their conservation.

The Effects of Alternative B on Water Resources

Impact Analysis

Development of this alternative would continue to expose NPS personnel and visitors at the visitor center to the potential impacts associated with the extreme floodplain. Construction of a new facility on the site of the existing parking and visitor center/administrative building would result in enlargement of the building footprint by 1000 square feet and increase the parking area by 1.5 acres. Approximately 1.5 acres of existing parking lot would be rehabilitated.

Surface Water and Ground Water

Impacts associated with this alternative would affect surface or ground water resources as in alternative A. This alternative would result in no net increase of impervious surface contributing to storm water runoff.

Floodplains

Floodplain regulations applicable to this alternative are identical to those in alternative A. Full reconstruction or expansion of existing facilities would require a Statement of Findings, should this alternative be selected.

Cumulative Impacts

Same as A.

Conclusion

Impacts associated with this alternative would be similar to those for alternative A. Full reconstruction or expansion of existing facilities would result in the continuation of existing trends, i.e. occupation of the 500-year floodplain in the Moose developed area, and would require a Statement of Findings as described in Special Directive 93-4. Conservation of watershed values is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect watershed values, particularly with the mitigation described, there would be no impairment of watershed resources or their conservation.

The Effects of Alternative C on Water Resources

Impact Analysis

Alternative C includes the construction of a 25,000 square foot visitor center, a 4-acre parking lot, 300 feet of new entrance road, relocation of the boat launch area, streambank stabilization of the northwest streambank of the Snake River in the Moose area, relocation of Moose-Wilson Road, and the construction or reconstruction of an administrative building on the existing visitor center site.

Surface Water and Ground Water

Impacts to surface and ground water resources due to the reconstruction or new construction of an administrative building on the existing visitor center site would be the same as alternative A or B.

Construction related activities associated with locating a new visitor center on the West of the post office site have the potential to produce non-point source pollution in the form of soil erosion, equipment fluid leakage, etc. This alternative presents a low risk of degrading water quality due to its distance from the Snake River. Mitigating measures would help protect resources from sediment and other deleterious material. Water wells and septic systems would be installed according to state and local regulations.

This alternative would create 5.1 acres of impervious surface for the facility, parking lot and road construction. Rehabilitation of the existing post office and Store (3.5 acres) and the existing visitor center parking lot (2.5 acres) would result in 6.0 acres of existing impervious surface to be restored to natural conditions. Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of impervious road surface.

The construction activities associated with the relocation of the boat launch area would represent a high risk of degrading water quality due to its proximity to the Snake River.

The activities associated with the bank stabilization would represent a high risk of degrading water quality, but for a short-term. Bank stabilization work would require compliance with Section 404 of the Clean Water Act.

Floodplains

Impacts to floodplains resulting from the reconstruction or new construction of an administrative building on the existing visitor center site would be the same as alternative A or B.

Alternative C is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study. Based on existing vegetation, the site is probably within an historic floodplain of the Snake River, as well as a backwater area for a Probable Maximum Flood (PMF) event, but would not be subject to NPS floodplain guidelines as such.

Additional data would be required to evaluate the impacts of boat launch relocation. A study conducted by the Bureau of Reclamation in 1998 indicated that there is considerable bank instability in the project area. A better understanding of the fluvial hydraulics along with monitoring/quantifying bank erosion in the area is needed. The relocation of the boat launch would require compliance with Section 404 of the Clean Water Act. Certain types of actions are functionally dependent upon locations in proximity to water. Small boat ramps with a total impact area of 0.1 acre or less may be excepted from the Statement of Findings requirement of Special Directive 93-4.

Cumulative Impacts

Same as A.

Conclusion

Impacts to surface and ground water resources resulting from the construction or reconstruction of administrative space on the location of the existing visitor center would be the same as alternative A or B.

The new construction of a visitor center west of the post office site would result in negligible effects to surface and ground water resources. Mitigating measures would help protect these

resources from sediment and other deleterious material. A beneficial effect of this alternative would be a net decrease of 0.9 acres of impervious surface contributing to storm water runoff.

Floodplains would be subject to a beneficial effect, due to the relocation of “Critical Actions” outside the regulatory floodplain. However, this alternative continues to maintain administrative facilities within the Moose developed area, and effects for this portion of the action would remain the same as in alternative A or B.

Bank stabilization of approximately 800 feet on the west bank of the Snake River would result in the beneficial effect of restoring degraded riparian habitat, an improvement over current conditions.

Conservation of watershed values is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect watershed values, particularly with the mitigation described, there would be no impairment of watershed resources or their conservation.

The Effects of Alternative D (Preferred Alternative) on Water Resources

Impact Analysis

This alternative locates the new visitor center on the site slightly southeast of the existing post office in Moose. Rehabilitation of the existing post office and store (3.5 acres) would result in a net decrease of approximately 1.5 acres of impervious surface on that site. This includes approximately 2.0 acres of new disturbance for the 25,000 square-foot building footprint, the small administrative parking area, and entrance road. Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of impervious road surface.

Surface and Ground Water

Impacts to surface and ground water resources resulting from the construction or reconstruction of administrative space on the location of the existing visitor center would be the same as alternative A or B.

Construction related activities associated with the new construction of a visitor center on the site slightly southeast of the existing post office and store have the potential to produce non-point source pollution in the form of soil erosion, equipment fluid leakage etc. This action presents a low risk of degrading water quality due to its distance from the Snake River. Mitigating measures would help protect resources from sediment and other deleterious material. Water wells and septic systems would be installed according to state and local regulations.

Construction related activities associated with the construction of the access trail and underpass could result in minor effects to surface water quality due to the proximity of the work to the Snake River. In addition, the installation of a series of ground water monitoring wells is recommended prior to underpass construction, to determine the feasibility of this action.

This alternative would create a decrease of 1.5 acres of impervious surface, which would contribute to storm water runoff. Relocation of the Moose-Wilson Road would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of impervious road surface.

Floodplains

Alternative D is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study.

Cumulative Impacts

Same as A.

Conclusion

Impacts to surface and ground water resources resulting from the construction or reconstruction of administrative space on the location of the existing visitor center would be the same as alternative A.

The new construction of a visitor center on the Woodland site would result in negligible effects to surface and ground water resources. Mitigating measures would help protect these resources from sediment and other deleterious material. This Alternative results in a net decrease of 1.5 acres of impervious surface contributing to stormwater runoff.

Floodplains would be subject to a beneficial effect, due to the relocation of “Critical Actions” outside the regulatory floodplain. However, this alternative continues to maintain administrative facilities within the Moose developed area, and effects for this portion of the action would remain the same as in alternative A.

Conservation of watershed values is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect watershed values, particularly with the mitigation described, there would be no impairment of watershed resources or their conservation.

The Effects of Alternative E on Water Resources

Impact Analysis

Alternative E locates a new visitor center on a bench southeast of the Snake River and includes the construction of a new 900-foot entrance road, an additional boat launch on the southwest side of the bridge in Moose, and construction of a new administration building on the site of the existing visitor center.

Surface and Ground Water

Impacts to surface and ground water resources resulting from the construction or reconstruction of administrative space on the location of the existing visitor center would be the same as alternative B.

Construction related activities associated with the new construction of a visitor center on the Southeast Snake River site have the potential to produce non-point source pollution in the form of soil erosion, equipment fluid leakage etc. This action presents a low risk of degrading water quality due to its distance from the Snake River. Mitigating measures would help protect resources from sediment and other deleterious material. Water wells and septic systems would be installed according to state and local regulations.

This alternative would create 6.0 acres of impervious surface for the facility, parking lot and road construction. Rehabilitation of the existing visitor center parking lot would result in 2.5 acres of existing impervious surface to be restored to natural conditions.

The construction of a new boat launch area would represent a high risk of degrading water quality due to its proximity to the Snake River.

Floodplains

This alternative includes the new construction of an administrative building on the existing visitor center site. Floodplain regulations, as in alternative B would apply. The new visitor center facility

would be located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study.

Additional data would be required to evaluate the impacts of the establishment of a new boat launch area. A study conducted by the Bureau of Reclamation in 1998 indicated that there is considerable bank instability in the project area (U.S. Bureau of Reclamation 1999). A better understanding of the fluvial hydraulics along with monitoring/quantifying bank erosion in the area is needed. The boat launch construction would require compliance with Section 404 of the Clean Water Act. Certain types of actions are functionally dependent upon locations in proximity to water. Small boat ramps with a total impact area of 0.1 acre or less may be excepted from the Statement of Findings requirement of Special Directive 93-4.

Cumulative Impacts

Same as A.

Conclusion

Impacts to surface and ground water resources resulting from the construction of administrative space on the location of the existing visitor center would be the same as alternative B.

The new construction of a visitor center on the East Snake River site would result in negligible effects to surface and ground water resources. Mitigating measures would help protect these resources from sediment and other deleterious material. An additional 3.5 acres of impervious surface would contribute to storm water runoff.

Floodplains would be subject to a beneficial effect, due to the relocation of "Critical Actions" outside the regulatory floodplain. However, this alternative continues to maintain administrative facilities within the Moose developed area, and effects for this portion of the action would remain the same as in alternative A.

Conservation of watershed values is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect watershed values, particularly with the mitigation described, there would be no impairment of watershed resources or their conservation.

The Effects of the Alternatives on Soils

Methodology

All available information on soil resources within the scope of the project has been compiled. Soils information was derived from the Soil Survey of Teton County, Wyoming, Grand Teton National Park Area, (Young 1982).

Impacts to soils are defined at various levels described in the table below. The impacts associated with each alternative were evaluated based on risk, intensity, duration and extent, and the type of soil that would be affected. Overlays of soil type were used in conducting the analysis.

Table 19. Definition of impacts on soils.

Beneficial Effect	An action that would improve soil properties as compared to current conditions
Negligible or No Effect	An action that is a low risk of causing physical disturbance/removal, compaction, unnatural erosion or contamination of the resource.
Minor Effect	An action that could represent a low risk of short-term (<3 years) degradation of soil properties, involving an increase of <5 acres of soil disturbance (as compared to current conditions), with slight compaction, unnatural erosion, or contamination involving non-toxic sources which do not persist in the environment.
Moderate Effect	An action that could represent a moderate risk of intermediate-term (>3.0 years but <5.0 years) degradation of soil properties, involving an increase of 5-10 acres of soil disturbance (as compared to current conditions), with moderate compaction, unnatural erosion, or the possibility of contamination by sources of pollution that are persistent in the environment, but will not move off site.
Major Effect	An action that could represent a high risk of long-term (>5 years) degradation of soil properties, involving the an increase of > 10.0 acres of soil disturbance (as compared to current conditions), with severe compaction, unnatural erosion, or the possibility of contamination by sources of pollution that are persistent in the environment, and may move off site.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

The Effects of Alternative A on Soils

Impact Analysis

Alternative A is located in an area of previously disturbed soils. Teton County soil surveys show the area to contain Tetonville-Wilsonville fine sandy loams. These soils are somewhat poorly drained. Flooding and wetness can be a hazard. Severe to moderate limitations exist for these soils for building site development due to flooding, wetness, cave-ins and frost action. These limitations may add additional costs to construction. Due to the disturbed nature of the site, surface soils probably do not represent natural conditions. Subsurface soils should present characteristics as mentioned above.

The existing visitor center, maintenance buildings, parking and storage currently occupy approximately 9.0 acres. No additional areas would be disturbed. Short-term construction related activities represent a negligible risk of degrading soil properties. Activities would cause increased compaction of soil resources in an area of less than 0.1 acres.

Cumulative Impacts

In the long term, soils lost to productivity would be those actually occupied by new facilities or road surfaces. These amounts are negligible in Alternative A. Mitigation measures such as natural vegetation replacement and noxious weed treatments would limit impacts on disturbed soils not occupied by new facilities to a negligible level over the long term. There would be no change in the area of lost soil productivity.

Using the same line of reasoning as expressed in the water quality section, if the area of concern for assessing cumulative impacts on soils is the scale of the park, none of the alternatives would add measurably to the total impact on soil resources. Anticipated park construction, present or future, will stay generally within existing development zones and specifically on previously disturbed development “footprints”. Development zones represent a limited portion of the entire park area, and within those zones only a small percentage of the surface area can actually be represented as an irreversible commitment of soil productivity.

Conclusions

Implementation of alternative A would result in negligible effects to soil resources. Conservation of soil is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect soils or soil characteristics, there would be no impairment of this resource.

The Effects of Alternative B on Soils

Impact Analysis

Short-term construction related activities represent a minor risk of degrading soil properties. Activities would cause increased compaction of soil resources in an area of less than 2.0 acres.

Cumulative Impacts

Same as A. Area of impact is less than 2.0 acres.

Conclusion

Implementation of alternative B would result in minor effects to soil resources. Conservation of soil is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect soils or soil characteristics, there would be no impairment of this resource.

The Effects of Alternative C on Soils

Impact Analysis

Alternative C is located in an area containing Tineman gravelly loams, Tetonville-Wilsonville fine sandy loams and soils of the Tetonville Complex. Tetonville Complex soils exhibit characteristics similar to the Tetonville-Wilsonville fine sandy loams described above. Tineman gravelly loams are well drained and have moderate to slight limitations for building site development. Erosion hazard for the Tineman soils is slightly higher than the others. A more detailed soil survey may be required to pinpoint the areas of Tineman gravelly loams, which would be preferred for building site selection.

This alternative would disturb 5.1 acres of soil surface for the facility, parking lot and road construction. Rehabilitation of the existing post office and store (3.5 acres) and the existing visitor center parking lot (2.5 acres) would result in 6.0 acres to be restored to natural conditions. Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of soil disturbance.

Approximately 11.1 acres of soil in the project construction limits (includes both new construction and rehab areas) would be compacted and trampled by the use of construction equipment. The potential for erosion would be slight for Tetonville soils and moderate for Tineman soils. Effects would be short-term, assuming prompt revegetation of the site. Activities would result in a net decrease of 0.9 acres of disturbed soil resources.

Cumulative Impacts

As in Alternatives A and B, in the long term, soils lost to productivity would be those actually occupied by new facilities or road surfaces. Mitigation measures such as natural vegetation replacement and noxious weed treatments would limit impacts on disturbed soils not occupied by new facilities to a negligible level over the long term. In alternative C, with rehabilitation as part of the alternative, there would be a net decrease of .9 acres in soil productivity.

Using the same line of reasoning as expressed in the water quality section, if the area of concern for assessing cumulative impacts on soils is the scale of the park, none of the alternatives would add measurably to the total impact on soil resources. Anticipated park construction, present or future, will stay generally within existing development zones and specifically on previously disturbed development “footprints”. Development zones represent a limited portion of the entire park area, and within those zones only a small percentage of the surface area can actually be represented as an irreversible commitment of soil productivity.

Conclusion

Impacts to soil resources resulting from the construction or reconstruction of administrative space on the location of the existing visitor center would be the same as alternative B. The new construction of a visitor center on the West of the post office site would result in minor effects to soil resources. Rehabilitation efforts would result in a net improvement of soil quality on approximately 0.9 acres – a beneficial effect. Trails located on these soils should be designed to control erosion hazards. Mitigation would help minimize soil loss or contamination from accidental spills.

Conservation of soil is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect soils or soil characteristics, there would be no impairment of this resource.

The Effects of Alternative D (Preferred Alternative) on Soils

Impact Analysis

Alternative D is located in an area containing Tetonville-Wilsonville fine sandy loams and soils of the Tetonville complex. These soils are somewhat poorly drained. Wetness and flooding are hazards to dwellings and on-site sewage disposal. Severe to moderate limitations exist for these soils for building site development due to flooding, wetness, cave-ins and frost action. These limitations may add additional costs to construction.

This alternative locates the new visitor center on a site southeast of the existing post office in Moose, and would result in approximately 2.0 acres of soil disturbance on that site. This includes the 25,000 square-foot building footprint, the small administrative parking area, and entrance road. Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of soil disturbance.

Approximately 10.0 acres of soil in the project construction limits (includes both new construction and rehab areas) would be compacted and trampled by the use of construction equipment. The potential for erosion would be slight until revegetation takes place, and effects would be short-term. Activities would result in a net decrease of 1.5 acres of disturbed soil resources.

Cumulative Impacts

Same as C. Alternatives E would create a net decrease of 1.5 acres of lost soil productivity.

Conclusion

Impacts to soil resources resulting from the construction/reconstruction of administrative space on the location of the existing visitor center would be the same as alternative B. The construction of a new visitor center and associated rehabilitation efforts would result in minor effects on soil resources. Mitigation would help minimize soil loss or contamination from accidental spills.

Conservation of soil is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect soils or soil characteristics, there would be no impairment of this resource.

The Effects of Alternative E on Soils

Impact Analysis

Alternative E is located in an area containing Tineman gravelly loams, and soils belonging to the Leavitt-Youga complex. These soils are well drained. Soils of the Leavitt-Youga complex have slight to moderate limitations for construction.

This alternative would disturb 6.0 acres of soil surface for the facility, parking lot and road construction. Rehabilitation of the existing visitor center parking lot would result in 2.5 acres to be restored to natural conditions.

Approximately 10.0 acres of soil in the project construction limits (includes both new construction and rehab areas) would be compacted and trampled by the use of construction equipment. The potential for erosion would be slight for Leavitt-Youga soils and moderate for Tineman soils until revegetation takes place. Activities would result in a net increase of 3.5 acres of disturbed soil resources.

Cumulative Impacts

Same as C. Alternatives E would create a net increase of 3.5 acres in lost soil productivity.

Conclusion

Impacts to soil resources resulting from the construction of administrative space on the location of the existing visitor center would be the same as alternative B. The construction of a new visitor center and associated rehabilitation efforts would result in minor, short-term effects on soil resources. Roads and/or trails located on these soils should be designed on the contour or with water bars to reduce soil loss. Mitigation would help minimize soil loss or contamination from accidental spills.

Conservation of soil is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect soils or soil characteristics, there would be no impairment of this resource.

The Effects of the Alternatives on Vegetation

Methodology

Analysis of impacts on vegetation resources was based on the amount/location of direct disturbance/removal of vegetation to construct the proposed developments, and the effects of increased foot traffic on herbaceous ground cover along trails compared to current conditions.

Table 20. Definition of impacts on vegetation.

Impact Category	Definition
Beneficial Effect	An action that would result in an increase in native vegetative cover.
Negligible or No Effect	An action that is a low risk of causing direct disturbance/removal of vegetation or increased foot traffic on herbaceous ground cover.
Minor Effect	An action that could represent a low risk of causing a decrease of up to 5 acres of native, vegetative cover or increased foot traffic on herbaceous ground cover.
Moderate Effect	An action that could represent a moderate risk of causing a decrease of up to 5-10 acres of native, vegetative cover increased foot traffic on herbaceous ground cover, or the potential removal of a limited vegetation type. Effects would be short-term (<5 years).
Major Effect	An action that could represent a high risk of causing a decrease of more than 10 acres of native, vegetative cover, increased foot traffic on herbaceous ground cover, or the removal of a limited vegetation type. Effects would be long-term (>5 years).
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

Effects of Alternative A on Vegetation

Impact Analysis

This alternative would not result in any new impacts on vegetation.

Cumulative Impacts

In the long term, vegetation lost to productivity would be that actually occupied by new facilities or road surfaces. Mitigation measures such as natural vegetation replacement and noxious weed treatments would limit impacts to a negligible level over the long term. Using the same line of reasoning as expressed in the water quality section, if the area of concern for assessing cumulative impacts on vegetation is the scale of the park, none of the alternatives would add measurably to the total impact on vegetation. Anticipated park construction, present or future, will stay generally within existing development zones and specifically on previously disturbed development “footprints”. Development zones represent a limited portion of the entire park area, and within those zones only a small percentage of the surface area can actually be represented as an irreversible commitment of lost vegetation. In alternative A there would be no impacts to vegetation.

Conclusions

The effects of this alternative on vegetation would be negligible. Conservation and protection of natural vegetation is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect vegetation, there would be no impairment of this resource.

The Effects of Alternative B on Vegetation

Impact Analysis

A large portion of this area has been previously disturbed. Impacts on vegetation would result in the disturbance/removal of less than 1 acre of vegetation to construct the proposed development,

mostly sagebrush/grass. Loss of less than 1 acre of this vegetation type would be a minor, long-term impact because of the availability of similar vegetation types in the park. A few aspen very near to the existing visitor center might have to be removed to allow for construction of the new building.

Cumulative Impacts

Overall, same as A. Less than 1 acre of vegetation would be lost through construction.

Conclusion

This alternative would result in negligible, long-term effects. Planting additional trees as needed could mitigate effects. Conservation and protection of natural vegetation is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect vegetation, there would be no impairment of this resource.

The Effects of Alternative C on Vegetation

Impact Analysis

This alternative would disturb 5.1 acres for the facility, parking lot and road construction. The type of vegetation that would be removed might include decadent cottonwood trees, some small aspen stands, several large spruce/fir species and sagebrush. Number and species removed would depend on the final site design. Two species of special concern would also be impacted by construction: *Triteleia grandiflora* (large-flowered triteleia) and *Sedum stenopetalum* (narrow-petaled stonecrop). The *Triteleia* was widely scattered and localized disturbance is unlikely to remove more than a few individuals. If possible, destruction of these plants should be avoided, but loss of a few stems creates little cause for concern (Markow 2001). The *Sedum* was found in such abundance on alternative C site that there is low probability of construction significantly affecting its occurrence in the park.

Rehabilitation of the existing post office and store (3.5 acres) and the existing visitor center parking lot (2.5 acres) would result in 6.0 acres to be restored to natural conditions. Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of vegetation disturbance. Activities would result in a net increase of 0.9 acres of natural vegetation.

Foot traffic associated with a visitor center would cause the loss of herbaceous ground cover along social trails. Increased foot traffic would result in the development of multiple trails along existing trails.

Boat launch relocation would represent a high risk removing a limited vegetation type – riparian vegetation. Removal of existing riparian vegetation would not be recommended, particularly within the project area, which is subject to severe streambank instability.

Cumulative Impacts

Overall, same as A. In alternative C, with rehabilitation as part of the alternative, there would be a net gain in vegetation of about 0.9 acres of natural vegetation.

Conclusions

This alternative would have the beneficial, long-term effect of increasing naturally vegetated areas by 0.9 acres. Increased foot traffic of herbaceous ground cover would result in minor effects. The park would maintain trails to encourage visitors to remain on existing trails, and may temporarily close trail during periods when they are most susceptible to damage (after heavy

rains, etc.). Immediate reclamation and weed control measures would reduce the potential spread of problem nonnative plants. Existing riparian vegetation in the area of the proposed boat launch relocation would be subject to moderate effects under this alternative.

Conservation and protection of natural vegetation is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect vegetation, there would be no impairment of this resource. Impacts on riparian vegetation in this alternative, while moderate and long-term, would be limited in extent and would not constitute impairment of this value in the park as a whole.

The Effects of Alternative D (Preferred Alternative) on Vegetation

This alternative locates the new visitor center on a site just southeast of the existing post office in Moose, and would result in approximately 2.0 acres of vegetation disturbance on that site. The type of vegetation removed would be mostly sagebrush/grass but could include decadent cottonwood trees, some small aspen stands, and several large spruce/fir species. The number and species removed would depend on the final site design. One species of special concern would also be impacted by construction: *Sedum stenopetalum* (narrow-petaled stonecrop). The *Sedum* was found in such abundance on alternative C site that there is low probability of construction significantly affecting its occurrence in the park (Markow 2001).

Relocation of the Moose-Wilson Road (0.6 miles) would be balanced by the rehabilitation of the abandoned portion of the road, resulting in no net increase of vegetation disturbance. Activities would result in a net decrease of 1.5 acres of disturbed native vegetation.

Foot traffic associated with a visitor center would cause the loss of herbaceous ground cover along social trails. Increased foot traffic would result in the development of multiple trails along existing trails.

Cumulative Impacts

Same as A overall. Alternative D would engender a net decrease of 1.5 acres of vegetation.

Conclusion

This alternative would result in minor, long-term effects to vegetation resources. Increased foot traffic of herbaceous ground cover would result in minor effects. The park would maintain trails to encourage visitors to remain on existing trails, and may temporarily close trails during periods when they are most susceptible to damage (after heavy rains, etc.). Immediate reclamation and weed control measures would reduce the potential spread of problem nonnative plants.

Conservation and protection of natural vegetation is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect vegetation, there would be no impairment of this resource.

The Effects of Alternative E on Vegetation

Impact Analysis

This alternative would disturb 6.0 acres of vegetation for the facility, parking lot and road construction. The type of vegetation that would be removed would consist of mostly sagebrush/grass. Considering the availability of similar vegetation types in the park, loss of this vegetation type would not create a significant impact. One species of special concern would also be impacted by construction: *Triteleia grandiflora* (large-flowered triteleia). The *Triteleia* was widely scattered and localized disturbance is unlikely to remove more than a few individuals. If

possible, destruction of these plants should be avoided, but loss of a few stems creates little cause for concern (Markow 2001).

Rehabilitation of the existing visitor center parking lot would result in 2.5 acres to be restored to natural conditions. Activities would result in a net decrease of 3.5 acres of native vegetation resources.

Foot traffic associated with a visitor center would cause the loss of herbaceous ground cover along social trails. Increased foot traffic would result in the development of multiple trails along existing trails.

Boat launch development would represent a high risk of removing a limited vegetation type – riparian vegetation. Removal of existing riparian vegetation would not be recommended, particularly within the project area, which is subject to severe streambank instability.

Cumulative Impacts

Same as A overall. Alternative E would result in a net decrease of 3.5 acres of native vegetation.

Conclusion

This alternative would present minor, long-term effects on vegetation resources. Increased foot traffic of herbaceous ground cover would result in minor effects. The park would maintain trails to encourage visitors to remain on existing trails, and may temporarily close trail during periods when they are most susceptible to damage (after heavy rains, etc.). Immediate reclamation and weed control measures would reduce the potential spread of problem nonnative plants. Existing riparian vegetation in the area of the proposed boat launch relocation would be subject to moderate effects under this alternative.

Conservation and protection of natural vegetation is necessary to fulfil the essential purposes of the park and its enjoyment, and to preserve the integrity of its natural systems. Because the impacts described in this alternative do not severely affect vegetation, there would be no impairment of this resource.

The Effects of the Alternatives on Wildlife

Methodology

The following sources of information were used to assess wildlife impacts:

1. Scientific literature on species' life histories, distributions, habitat selection, and responses to human activities.
2. Site-specific information on wildlife, including complete and on-going studies (when available), and the professional judgment of park or state biologists familiar with the status and management concerns related to individual species.

The effect analyses for wildlife were based on several factors. These were: (1) the known or likely occurrence of a species or its habitat in the affected area, (2) the loss of wildlife due to construction activities, (3) the direct loss of habitat due to actual ground disturbance, and (4) the effective loss of habitat (through avoidance or abandonment by wildlife) in the area due to visitor or construction activities and noise. Effects discussions are grouped under the general headings of *Wildlife*, *Threatened and Endangered Species*, and *Species of Special Concern*. The duration of effects is noted (short versus long term) as well as the degree. Table 21 defines the estimates of impact levels on wildlife in this document.

Table 21. Definition of impacts to wildlife, including federally protected species and species of special concern.

Impact Category	Definition
No Effect	An action that does not affect a species.
No Known Effect	An action that may affect a species elsewhere but for which there are no demonstrated effects known to occur in the park.
Negligible	An action that may affect a population or individuals of a species, but the effect will be so small that it will not be of any measurable or perceptible consequence to the population.
Minor	An action that may affect a population or individuals of a species, but the effect will be small; if it is measurable; it will be a small and localized consequence to the population.
Moderate	An action that will affect a population or individuals of a species; the effect will be measurable and will have a sufficient consequence to the population but is more localized.
Major	An action that will noticeably affect a population or individuals of a species; the effect will be measurable and will have a substantial and possible permanent consequence to the population.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

In estimating wildlife impacts, it was assumed that development and use of a larger visitor center would not influence the numbers of visitors to the park, but rather that visitor use patterns would continue to be influenced by other primary factors.

The Effects of Alternative A on Wildlife

Impact Analysis

Short-term effects. Construction might cause the destruction of burrowing animals and the nests of some ground-nesting birds. Increases in noise and the level of human activity would temporarily displace species sensitive to human disturbance. These impacts would be negligible, however, because they would not have a principal effect at the population level on biological resources and habitat.

Long-term effects. Continued use of the existing facilities would not cause any new adverse impacts on wildlife. The Moose development area is located within the riparian zone of the Snake River. This area is recognized as high value habitat for many wildlife species.

The primary effects of the development include avoidance and displacement of this habitat. The avoidance of this area by wildlife would continue to result in negligible to minor adverse effects on individual animals and wildlife populations.

Under the no action alternative the reconstruction of the current visitor center and administration building would not adversely influence species near the site given the current level of human activity.

Species of Special Concern Impact Analysis.

There would be no adverse direct or indirect impacts on species of special concern.

Threatened and Endangered Species Impact Analysis

Short-term effects. Increases in noise and the level of human activity would temporarily displace species sensitive to human disturbance. These species include bald eagles, grizzly bears, gray wolves and lynx. These effects would be negligible and short-term.

Long-term effects. The primary adverse direct effects to grizzly bears would be management actions taken against bears as a result of human-bear conflicts associated with human use in the area of Moose and the visitor center. Management actions include removal and translocation of bears from the parks or, in worst case situations, lethal control. This type of management action has never been necessary in the Moose area. Because of the unlikely nature of the potential impact, alternative A would result in negligible adverse effects on grizzly bears.

Occasional recreational activities may displace eagles from perches, but the impact is considered minor and short-term due to the fidelity bald eagles have to their traditional perches. Because the nearest bald eagle nests are approximately 1 ¼ and 1 ¾ miles from the visitor center, occasional flushing of bald eagles from perches in peripheral areas would result in negligible adverse impacts on the foraging success of individual birds.

In GTNP, the most important bald eagle wintering area, the Snake River floodplain, is closed to public access from the Buffalo Fork confluence to Menor's Ferry from February 15 until August 15. The floodplain south of the bridge is not closed due to existing areas of development. Furthermore, under current park policy, areas within a 0.5-mile radius around bald eagle nests on the Snake River are closed to public access from February 15 through August 15. If monitoring indicates disturbance to bald eagles, additional closures may be enacted.

Because human development and activities already characterize this site, any new long-term adverse impacts would be negligible.

Cumulative Impacts

The primary area of concern about the alternatives in relation to wildlife and ecological systems is that of wildlife habitats and migration routes for ungulate species that move through the Moose area, or through sites represented in the various alternatives. Within this area of concern lie development zones and road corridors identified in the Grand Teton Master Plan plus existing development (e.g., roads, trails, and houses) outside the park. Presently, the focus for ungulate movement through the area is the Jackson Hole National Elk Refuge, with the exception of moose – which move through and occupy the study area but do not tend to migrate to the refuge.

Anticipated growth in the nearby Jackson and Teton Village areas would probably result in the conversion of land outside the park from a natural to a developed state. Future development could increasingly displace wildlife populations and reduce diversity and effective habitat.

Development would continue to cause greater impacts on some wildlife species, particularly those that have a large range such as elk.

The proposed alternatives, since they neither represent a new facility or use, would not add significantly to the cumulative impact of all these possible sources of change. This is particularly true since they do not affect the numbers of visitors to the park or the travel routes that visitors use.

The combined effect of all activities is not likely to cause an adverse cumulative impact on federally listed species because of the conservation efforts that would be taken for this project and for other activities in the surrounding area. In addition, implementation of species recovery plans will be effective in maintaining or restoring populations of threatened and endangered species.

In all alternatives, long-term impacts on sensitive species would either not occur or would be negligible. Therefore, there would be no additive cumulative impact on sensitive species associated with the proposed action.

Conclusion

Alternative A would result in continued long-term direct negligible effects on wildlife populations. Negligible long-term impacts on bald eagles, gray wolves, grizzly bears, and lynx would result from the human activity within the Moose area and displacement and avoidance of the Snake River corridor.

The Effects of Alternative B on Wildlife

Impact Analysis

Short-term effects. Same as Alternative A.

Long-term effects. A larger visitor center and parking area would probably result in minor decreases in existing vegetation and habitat around the visitor center. Several species of nesting birds use these areas. However, vegetation rehabilitation of the island that currently lies between the road and the parking area would partially offset these decreases. Because human development and activities already characterize this site, any long-term adverse impacts would be negligible.

Species of Special Concern

There would be no adverse direct or indirect impacts on species of special concern.

Threatened and Endangered Species

Short-term effects. Negligible short-term adverse impacts on threatened or endangered species would result from construction. Gray wolves, grizzly bears, lynx, and bald eagles have all been located within two miles of the current visitor center and there could be temporary displacement or avoidance by these species and their prey due to increased noise and human activity at the site.

Whooping cranes are unlikely to occur in the project area, and thus there would be no impacts on this species in any of the alternatives.

Because the nearest bald eagle nests are approximately 1 ¼ and 1 ¾ miles from the visitor center, increased human activity could cause occasional flushing of birds from perches in peripheral areas.

Long-term effects. Negligible long-term impacts on gray wolves, grizzly bears, and lynx would result from the enlargement of the development and increased human activity.

Occasional flushing of bald eagles from perches in peripheral areas would result in negligible adverse impacts on the foraging success of individual birds.

Cumulative Impacts

Same as A.

Conclusion

Alternative B would result in continued long-term direct negligible effects on wildlife populations. Negligible long-term impacts on bald eagles, gray wolves, grizzly bears, and lynx would result from the human activity within the Moose area and displacement and avoidance of the Snake River corridor.

Short-term direct and negligible effects would occur to wildlife species that would be displaced by the increase in activity associated with the construction of the new administration building and visitor center.

The Effects of Alternative C on Wildlife

Impact Analysis

Short-term impacts. Constructing the proposed facilities would have minor adverse impacts on wildlife that use the Snake River corridor near Moose as well as the adjacent upland habitat. Short-term impacts would result from increased noise from heavy equipment and construction activities that could destroy burrowing animals, such as voles and shrews and the nests of some ground-nesting birds. Construction activities would also cause animals intolerant of human presence and noise to avoid undisturbed habitat surrounding the project area during the construction periods. Elk, moose, mule deer, and pronghorn antelope commonly forage here and use the area as a travel corridor, and could be displaced temporarily from habitat near the construction site.

Long-term impacts. Minor long-term adverse impacts would result from the displacement of wildlife and loss of habitat. This alternative involves development in the outer limits of the Snake River riparian area, which serves as an important travel corridor and habitat for a variety of wildlife. Existing developments in the area, including the Moose NPS administrative and housing areas, the Moose Post Office, The Murie Center, and Dorman's probably restrict use of this habitat by many resident riparian-obligate species and as a travel corridor by others. Development associated with this alternative would further restrict use. In addition, increased human activity around the new visitor center could cause wildlife to continue avoiding the otherwise suitable habitat in the area surrounding the new facilities after the construction phase is completed.

Although impacts on wildlife will be detectable due to displacement and habitat removal, alternate habitat is available and effects on individuals of a species will not have an adverse impact on overall populations. In addition, alternative C proposes mitigation in the form of rehabilitating the existing visitor center and post office parking areas, removing the post office and Moose Village Store, and rehabilitating those sites. Long-term impacts on amphibians, reptiles, and fish would be negligible. Long-term impacts on other non-sensitive species would be minor.

Species of Special Concern

Overall, short- and long-term direct impacts due to the construction and use of the proposed facilities would be negligible. In addition, removal of sagebrush habitat would have a minor adverse affect on sage grouse by decreasing foraging opportunities.

Threatened and Endangered Species

Short-term effects. In general, alternative C would have greater adverse impacts compared to alternative A due to construction on undeveloped land and increased noise and activity levels. These would be short-term negligible impacts.

Long-term effects. Alternative C differs from the other alternatives in that it is farther from the Snake River. The site contains neither foraging nor nesting habitat for bald eagles and thus they would experience no adverse effects. Because of the presence of alternative habitat and due to the amount of human activity already in the area, there would be negligible long-term adverse effects on grizzly bears, gray wolves and lynx due to loss of habitat and, primarily, restriction of the riparian travel corridor.

Wolves prey on small mammals during the snow-free months. Hence, there would be a negligible indirect impact on wolves due to loss of small mammal habitat. Due to the small size of the proposed development (4 acres) and the presence of nearby small mammal habitat, this loss would have little effect.

Cumulative Impacts

Alternative C involves development in the outer limits of the Snake River riparian area, which serves as an important travel corridor and habitat for a variety of wildlife. Existing developments in the area, including the Moose NPS administrative and housing areas, the Moose Post Office, The Murie Center, and Dornan's probably restrict use of this habitat by many resident riparian-obligate species and as a travel corridor by others. Development associated with this alternative would further restrict use. In addition, increased human activity around the new visitor center could cause wildlife to continue avoiding the otherwise suitable habitat in the area surrounding the new facilities after the construction phase is completed.

Conclusion

The removal of sagebrush habitat would have a minor adverse affect on sage grouse by decreasing foraging opportunities. There would be a negligible indirect long-term impact on wolves due to loss of small mammal habitat presence of alternative habitat and due to the amount of human activity already in the area. There would be negligible long-term adverse effects on grizzly bears, gray wolves and lynx due to loss of habitat and, primarily, restriction of the riparian travel corridor.

Alternative C would have increased levels of adverse short-term and long-term direct impacts because the construction would occur at a site that is currently undeveloped. This alternative would increase the development footprint of the Moose area and so decrease the area of available habitat to wildlife species.

Although impacts on wildlife will be detectable due to displacement and habitat removal, alternate habitat is present and effects on individuals of a species will not have an adverse impact on overall populations. Minor long-term adverse impacts would result from the displacement of wildlife and loss of habitat.

The Effects of Alternative D (Preferred Alternative) on Wildlife

Impact Analysis

Short-term effects. Because the alternative D site is in close proximity to and similar in vegetation to the site for alternative C, impacts would be similar. However, because D is closer to existing development and includes a smaller developed area, there would be a decrease in the loss of wildlife habitat and less destruction of small burrowing animals and nests of some ground-nesting birds during construction. The proximity to existing development reduces impacts on wildlife use of the Snake River riparian travel corridor.

As in alternative C, relocation of the 0.6-mile section of the Moose-Wilson Road will cause short-term negligible impacts due to disturbance from construction activities and could destroy burrowing animals, such as voles and shrews and the nests of some ground-nesting birds. Construction of a short road (less than 1/10 of a mile long) for limited parking and handicap access, a paved pathway, and rehabilitation of the current post office and parking lot site will also cause short-term disturbance although less than in alternatives C and E. Short-term adverse impacts on non-sensitive species would be negligible.

Long-term effects. Placing the visitor center on the south side of the Teton Park Road expands the footprint of development in the Moose area and reduces existing vegetation and habitat. In

this alternative, development is restrained in comparison to alternative C and alternative E through several means. Locating the primary parking area on the north side of the Teton Park Road on the existing visitor center parking site reduces long-term disturbance. On the south side of the Teton Park Road, limiting parking and road construction and rehabilitating the existing developed site (including the existing post office, store, and parking area) also reduce long-term impacts due to disturbance and habitat removal.

Relocating the Moose-Wilson Road will have long-term beneficial impacts. Currently its alignment is within a wildlife travel corridor and close to existing development. Relocation would reduce the concentration of development in the immediate vicinity of the new visitor center, administration building and parking and enable travel through the wooded areas between the Moose-Wilson Road in its new alignment and the developed area.

Because human development and activities already occur on the periphery of this site, long-term adverse impacts would be negligible.

Species of Special Concern

Adverse impacts on species of special concern would be less than those from alternative C and alternative E and greater than A and B. The site is already developed where the post office and store are located and this area will be rehabilitated. Because the visitor center will be located south and east of the existing development, vegetation and habitat removal will occur and the current influence of human disturbance will be expanded. Removal of sagebrush habitat would have a minor adverse affect on sage grouse by decreasing foraging opportunities.

The size of the developed area will be smaller than in alternatives C and E and impacts will be reduced. Overall, short- and long-term direct impacts due to the construction and use of the proposed facilities would be negligible.

Threatened and Endangered Species

Please refer to the Biological Assessment for a detailed impact analysis on threatened and endangered species. The section below describes impacts and makes comparisons between alternatives.

Short-term effects. In general, alternative D would have greater adverse impacts compared to alternatives A or B due to construction on undeveloped land and increased noise and activity levels. Negligible short-term adverse impacts would result although fewer than those from alternatives C and E due to the primary parking area being mainly confined to the existing parking lot. As mentioned in Mitigation for alternative B, visitor activities and trails should remain outside the 0.5-mile area buffering the Moose bald eagle nest from disturbance.

Long-term effects. Although the site for alternative D is not directly on the Snake River, a proposed paved pathway travels roughly parallel to the river for approximately 450 feet. Approximately 100 feet away from and adjacent to the riverbank near the west end of the Moose Bridge, it gradually shifts away from the river, and is about 200 feet in length when it turns to the west and approaches the visitor center. This path passes within approximately 130 feet of perch trees regularly used by bald eagles for foraging. Because there is only low vegetation between the trees and the trail location, a high level of human disturbance would result and use of these trees would be greatly reduced or abandoned. Currently, a few fishermen and visitors use this area infrequently and may displace eagles. High visitation in the summer, with people walking along the pathway, would result in minor long-term impacts. Nests are beyond the 0.5-mile closure area and are not an issue in the area of the pathway.

Because of the presence of alternative habitat and due to the amount of human activity already in the area, there would be negligible long-term adverse effects on grizzly bears, gray wolves and lynx due to loss of habitat and, primarily, restriction of the riparian travel corridor.

Wolves prey on small mammals during the snow-free months. Hence, there would be a negligible indirect impact on wolves due to loss of small mammal habitat. Due to the decreased size of the proposed development and the presence of nearby small mammal habitat, this loss would have little effect.

Cumulative Impacts

Same as B.

Conclusion

The removal of sagebrush habitat would have a minor adverse affect on sage grouse by decreasing foraging opportunities. Negligible short-term adverse impacts would affect grizzly bears, gray wolves, and lynx due to construction and human activity. There would be long-term direct negligible and adverse effects on these species due their avoidance of human developments. Bald eagles currently use this section of the Snake River for perching and foraging. They would be displaced and experience minor short-term and long-term impacts due to high levels of human activity and loss of traditional habitat. Although human development and activities already characterize this area, long-term adverse impacts are minor due to increased visitation and expansion of the zone of influence.

This alternative increases the development footprint of the Moose area compared to alternatives A and B, although to a lesser extent than alternatives C and E. It decreases the area of available habitat to wildlife species and restricts the riparian travel corridor. Although impacts on wildlife will be detectable due to displacement and habitat removal, alternate habitat is readily available and effects on individuals of a species will not have an adverse impact on overall populations. Minor long-term adverse impacts would result from the displacement of wildlife and loss of habitat.

The Effects of Alternative E on Wildlife

Impact Analysis

Short-term effects. Minor adverse impacts due to construction activities and ground disturbance on an undeveloped site are similar to but greater than those in alternative C because of increased construction and the location of the alternative E site adjacent to the Snake River. Construction will take place in more locations and the areas disturbed would include habitat on both sides of the river. Many wildlife species use the riverine habitat and could be disturbed and displaced. Increases in construction compared to other alternatives include: construction of a boat launch and access road on the west side of the Snake River south of the Moose bridge, expansion of the existing Post Office parking area, and construction of earth berms on the east side of the new visitor center and berms surrounding two parking areas.

Long-term effects. This area contains crucial winter range for moose. In GTNP, five areas that have been shown to be particularly sensitive to wintering wildlife have been regulated and are closed to human use throughout the winter season. The closest of these to site E is along the Snake River floodplain, from the confluence of the Buffalo Fork (at Moran Junction) downstream to the Menor's Ferry crossing north of the Moose development. This closure provides winter habitat for elk, moose, bison, trumpeter swans, bald eagles, and wolves. Site E is approximately 0.5 mile south of Menor's Ferry, on the bench above the floodplain. Moose, bald eagles, coyotes, a variety of waterfowl, and other small mammals and birds regularly use the riparian area

downstream of the Moose Bridge and immediately adjacent to the proposed site. With development and the onset of high visitor use, wildlife would be displaced from this area in the river corridor.

Short- and long-term adverse impacts on non-sensitive wildlife species for this alternative would be minor.

Species of Special Concern

This alternative is similar to alternative C in that impacts due to the construction and use of the proposed facilities would be negligible. Short-term and long-term impacts are greater than those in alternative A because vegetation and habitat removal will occur on an undeveloped site and the current influence of human development will be expanded. Removal of sagebrush habitat would have a minor adverse affect on sage grouse because of loss of habitat and foraging opportunities.

Threatened and Endangered Species

Short-term effects. In general, alternative E would have greater adverse impacts than other alternatives due to construction on undeveloped land on both sides of the Snake River and increased noise and human activity levels. The short-term effects of this alternative would be most similar to alternatives C and D. Because there is already human activity in the Moose area, there would be negligible short- and long-term effects on grizzly bears, gray wolves, and lynx due to loss of habitat and, primarily, further restriction of the riparian travel corridor. Bald eagles would experience minor, short-term adverse effects because construction of the boat launch and parking area would displace them from perch trees approximately 200 feet away. These trees are approximately 110 meters (365 feet) south of Moose Bridge on the west side of the river.

Long-term effects. Because of the nearness of site E to the Snake River corridor and the latter's known use as habitat and as a travel corridor, there would be negligible long-term effects on lynx, gray wolves, and grizzly bears due to their avoidance of human developments. Bald eagles would experience minor adverse effects. Development and associated visitor use patterns from both the new visitor center, located directly across from the perch trees, and the new boat launch and road, only a few hundred feet away, would displace eagles from these sites and potentially cause eagles to abandon known habitat.

As in alternative C, there would be a negligible adverse effect on wolves due to removal of small mammal habitat.

Alternative E would be less than one mile from the current Moose bald eagle nest, and therefore effective restrictions on dispersed visitor use would be required. The 0.5 mile buffer surrounding bald eagle nests would be in place and enforced yearly, between February 15 and August 15. As in all park eagle nest closures, boats would be allowed to travel along the river through the closure but not allowed to stop or allow passengers to disembark.

Cumulative Impacts

Same as C.

Conclusion

To summarize and compare this alternative to alternative A, alternative E would have increased levels of short- term impacts due to construction at an undeveloped site, and increased noise and human activity levels. There would be short- and long-term direct negligible adverse effects on lynx, gray wolves, and grizzly bears due to their avoidance of human developments. Bald eagles, which have regularly used perch sites on the west side of the Snake River directly across from the proposed visitor center and approximately 200 feet from the proposed new boat launch and road, would experience minor short- and long-term effects. Development and associated visitor use

patterns would displace eagles from these sites and potentially cause abandonment. There would be an additional negligible adverse effect on wolves due to removal of small mammal habitat.

This alternative, like alternative C, would increase the development footprint of the Moose Area and so decrease the area of available habitat for wildlife species. The adverse effect of this increase in development would be exacerbated by the fact that the displacement would occur in the Snake River corridor.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

The Effects of the Alternatives on Health and Safety

Methodology

Public health and safety for park visitors, residents and employees, for the purposes of this analysis, relates to the building safety and motor vehicle accidents in the Moose vicinity. To assess the relative impact of the alternatives for the Moose area, two studies were conducted. *The Seismic Evaluation: Moose Visitor Center, Grand Teton National Park*: (Sato and Associates 1998) was completed to comply with Executive Order 12941 which requires Federal agencies to evaluate and mitigate seismic hazards in their owned and leased buildings.

The second study, *Floodplain Analysis for the Snake River in the area of Moose* (NPS 2001), was conducted by the NPS Water Resources Division. The study determined where the 500-year regulatory floodplain is located in the Moose area. Health and safety risks for visitors and employees were assessed by determining the amount of proposed development that would be located within the floodplain for each alternative.

To analyze motor vehicle accidents, case incident reports for the Moose area were surveyed for the years 1997 through 2000. The causes and locations for vehicle and pedestrian accidents were compiled and the types of accidents that occurred were noted.

The impact levels identified for each alternative are relative to those stated in alternative A. All impacts to public health are defined as short-term. The intensity of effects used in the analysis of health and safety is defined as follows:

Table 22. Definition of impacts to health and safety.

Impact Category	Definition
Negligible	The impact on human health and safety is not measurable or perceptible.
Minor	The impact on health and safety is measurable or perceptible and is limited to a relatively small number of visitors or employees at localized areas. Impacts to public safety may be realized through a minor increase or decrease in the potential for visitor conflicts in current accident areas.
Moderate	The impact is sufficient to cause a permanent change in accident rates at existing low accident locations or create the potential for additional concerns in area that currently do not exhibit noticeable visitor or employee accident trends.
Major	The impact is to public or employee safety is substantial through the elimination of potential hazards or the creation of new areas with a high potential for serious accidents or hazards.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

The Effects of Alternative A on Health and Safety

Building Safety Impact Analysis

Under alternative A, park staff and visitors would continue to occupy the existing headquarters building. Minor construction would occur to fix deficiencies in the structural integrity of the building, such as repair to the roof and windows.

The evaluation process of FEMA 178 makes it clear the present wall system in the structure does not provide adequate shear resistance to withstand a design seismic event. These deficiencies could lead to partial or complete structural collapse. Because Moose lies in an area of high seismic activity, the high and continued occupancy of a structure with these deficiencies creates life safety risks that are of concern. The effects of this alternative on visitors and employees would continue to be moderate and adverse.

Floodplain Impact Analysis

The NPS Floodplain Analysis for the Snake River in the area of Moose (NPS 2001), determined the Moose visitor center developed area to be located partially within the 500-year floodplain. The existing visitor center/administrative building itself is shown to be located outside the 500-year floodplain. The maintenance facility is totally within the 500-year floodplain, which would also be the regulatory floodplain for this structure (emergency services are located there). Additionally, a fuel storage shed, a water treatment plant, and the park library are within the 500-year floodplain boundaries. Because buildings with a high occupancy rate are located outside the 500-year floodplain the effects of alternative A would be continue to be negligible, short-term and adverse.

Pedestrian and Vehicle Accidents Impact Analysis

Alternative A would result in the continuation of existing trends in motor vehicle accidents in and around the Moose area. Parking accidents would continue to be the most common type of accidents in the Moose area, followed by collisions at the entrance station and accidents at the

intersection of the Moose- Wilson Road and the Teton Park Road. The effects of alternative A would continue to be minor and adverse on visitors, residents and employees.

Conclusion

The effects of alternative A on visitors and employees would continue to be moderate and adverse because the visitor and administration building have been determined to be inadequate and would not withstand a design seismic event.

Parking lot accidents, accidents at the Moose-Wilson Road and the US Highway 191 intersection would continue to cause direct minor adverse effects on visitors, residents and employees.

The Effects of Alternative B on Health and Safety

Building Safety Impact Analysis

Alternative B would construct a new building on the existing site of the visitor center and administration building. The new building would comply with all seismic standards resulting in moderate beneficial improvements to visitor and employee safety when compared to alternative A.

Floodplain Impact Analysis

The effects of alternative B on development within floodplains would be similar to alternative A.

Pedestrian and Motor Vehicle Safety Impact Analysis

The effects of alternative B on pedestrian and motor vehicle safety would be similar to alternative A.

Conclusion

The effects of alternative B on visitors and employees would result in moderate beneficial improvements to visitor and employee safety when compared to alternative A. The effects of alternative B on development within floodplains and pedestrian and motor vehicle safety would be similar to alternative A.

The Effects of Alternative C on Health and Safety

Building Safety Impact Analysis

Alternative C would reconstruct a new administrative building on the existing site of the visitor center and administration building. The new visitor center building would be constructed on a site to the west of the existing post office facility. The new building would comply with all seismic standards resulting in moderate beneficial improvements to visitor and employee safety when compared to alternative A. Major reconstruction of the existing administrative building would be required to bring the facility to a standard that would meet the requirements of FEMA 178. Because the reconstruction of the administration building would marginally meet and not exceed the requirements of FEMA 178 it would result in moderate to minor improvements to human health and safety. The new construction of a new visitor center would result in moderate beneficial improvements to visitor and employee safety.

Floodplain Impact Analysis

Alternative C is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study. Based on existing vegetation, the site is probably within an historic floodplain of the Snake River, as well as a backwater area for a Probable Maximum Flood (PMF) event, but would not be subject to NPS floodplain guidelines as such.

Pedestrian and Motor Vehicle Safety Impact Analysis

The effects of alternative C on pedestrian and motor vehicle safety would be similar to alternative A for most action items. Relocating the Moose Wilson Road intersection to a more open sagebrush area away from the Moose developed area would likely reduce accidents at that intersection. This would result in a minor improvement to visitor safety. However because the proposed visitor center would be located on the south side of the road it would require the majority of visitors to make a left hand turn across traffic. A turning lane would be required to mitigate the resultant adverse effect on safety.

Conclusion

The construction and reconstruction of buildings in alternative C would result in moderate to minor improvements to human health and safety. Impacts to floodplains would be negligible. The effects of alternative C on pedestrian and motor vehicle safety would be similar to alternative A for most action items.

The Effects of Alternative D (Preferred Alternative) on Health and Safety

Building Safety Impact Analysis

Alternative D would construct a new administrative building adjacent to the site of the visitor center and administration building. The new visitor center building would be constructed on a site southeast of the existing post office. The Moose Village Store and the post office would be incorporated into the new administration building. All new construction would comply with FEMA seismic standards and would result in moderate beneficial improvements to visitor and employee safety when compared to alternative A.

Floodplain Impact Analysis

Alternative D is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study.

Pedestrian and Motor Vehicle Safety Impact Analysis

Relocating the Moose-Wilson Road intersection to a more open sagebrush area away from the Moose developed area would likely reduce accidents at that intersection. This would result in a minor improvement to visitor safety. In alternative D, the majority of visitors would make a right-hand turn to access the visitor center parking lot, which is safer than making a left-hand turn that would cross traffic. From the same parking lot, visitors could use the post office and store, adjacent to the administration building. Fishing enthusiasts would be encouraged to access the Snake River via the visitor center parking area instead of parking along side the Teton Park Road.

Conclusion

All new construction would comply with FEMA seismic standards and would result in moderate beneficial improvements to visitor and employee safety when compared to alternative A. Alternative D is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study. There would be minor improvements to pedestrian and motor vehicle safety through relocation of the Moose-Wilson road intersection.

The Effects of Alternative E on Health and Safety

Building Safety Impact Analysis

Alternative E would construct a new administrative building on the existing site of the visitor center and administration building. A new visitor center would be constructed on the south- east side of the Snake River. All new construction would comply with FEMA seismic standards and

would result in moderate beneficial improvements to visitor and employee safety when compared to alternative A.

Floodplains Impact Analysis

Alternative E is located outside the 500-year (or regulatory) floodplain, as determined by the recent NPS Water Resources Division study.

Pedestrian and Motor Vehicle Safety Impact Analysis

A minor to moderate improvement to visitor safety would be expected under alternative E. The visitor center complex would be highly visible from US Highway 191 26/89, the primary access route for visitors coming to the Moose area. The high visibility of the area would serve to alert visitors and perhaps lessen the frequency of rear end collisions at the Teton Park Road and US Highway 191.

Conclusion

Alternative E would result in moderate beneficial improvements to visitor and employee safety when compared to alternative A. The construction of new buildings would meet FEMA 178 standards. There would be no impact on floodplains. The high visibility of the area would serve to alert visitors and perhaps lessen the frequency of rear end collisions at the Teton Park Road and US Highway 191 resulting in minor improvements to visitor safety.

The Effects of the Alternatives on Visitor Experience

Methodology

Grand Teton National Park has had several visitor surveys performed in the past. Three surveys performed by the Cooperative Park Studies Unit, University of Idaho, are the primary resources used to analyze the effects of the alternatives on visitor experience. These studies are referred to as Visitor Services Project (VSP) surveys and are referred to by the dates of the study, though reports are usually published in the next calendar year following the study. The park has three VSP surveys on file, two for the main visitor seasons of 1987 and 1997, and one for the winter of 1994 –1995. The main season surveys address Grand Teton National Park, while the winter survey combines information for both Yellowstone and Grand Teton National Parks.

The VSP surveys were performed using standard sampling techniques discussed in the Methods section of each survey. The surveys were mail return questionnaires with a brief questioning period during the transmission of the survey. These initial questions dealt only with collecting sufficient data to mail reminder letters and follow-up questionnaires if needed. The visitors then responded by mail. The Methods section also includes discussion of analysis, sample size, missing data, reporting errors, limitations and any special conditions that pertained. The chief limitation of the surveys is that the data collected apply only to the season of the year in which it was collected. For example, extrapolating winter data to the summer visitor season would be inappropriate.

The next set of data that are referred to are the Visitor Survey Card studies that are coordinated by the same institution, annually since 1998, as part of the Government Performance and Results Act (GPRA) (31 USC 1115 et seq PL 103-62). These surveys carry a similar discussion of methodology with similar limitations.

Visitors to the Moose Visitor Center are counted electronically as they enter and exit the front doors. The front entry to the visitor center has two pairs of doors across which a light beam passes. Through the years the multipliers have been adjusted by performing hand counts during various times of the day. The multipliers are then used to adjust the raw counter numbers because

there is no way of separating entering or exiting traffic. The counters have been problematic, with various types of beam generators, reflectors, counters and battery and AC power supplies used. Whatever their limitations, the numbers generated are the numbers used for all annual reports that address visits to the Moose Visitor Center.

The consequences of each alternative on the visitor experience will be discussed as those impacts bear on certain facets of the experience. These criteria were derived from the range of experiences that the average visitor would encounter in circulating through the Moose area and in seeking out opportunities to interact with the park resources or environment. Because the average visitor's experience is primarily with the visitor center and its associated programs, the post office and the Moose Village Store, the analysis concentrates on these activities. As referred to in the Affected Environment section, the criteria for evaluating the quality of the visitor experience in the Moose area are:

- The ease of locating the visitor center
- The ease of access to quality information and orientation (visitor services)
- The convenience and safety of vehicle and pedestrian circulation and its contribution to an easy, intuitive orientation experience
- The proximity to other activities highlighting park resources or recreation opportunities

For purposes of analyzing potential impacts, the thresholds of change for the intensity of an impact are defined as follows:

Table 23. Definition of impacts on visitor experience.

Impact	Definition
Negligible:	An action that would affect very few visitors and their experiences or access to recreational opportunities.
Minor:	An action that would affect relatively small numbers of visitors and their experiences or access to recreation opportunities.
Moderate:	An action that would cause measurable effects on: (1) a relatively moderate number of visitors; (2) the relations between user groups seeking recreational experiences, (3) a moderate increase or decrease in the number of opportunities for resource interaction or activity.
Major:	An action that would substantially alter the visitor center experience from the standpoint of the visitor or opportunities offered for resource or recreation interaction.

The Effects of Alternative A on Visitor Experience

Ease of Locating Important Park Facilities and the Ability to Access Information and Orientation

Under this alternative, visitors will continue to experience moderate adverse effects related to the difficulty of locating the visitor center. Those who currently miss, ignore or bypass the visitor center will continue to do so in higher numbers, as visitation increases, resulting in a larger number of visitors entering the park without primary resource or safety information, or orientation tools.

Convenience and Safety of Pedestrian and Vehicle Circulation

Detracting from easy and intuitive access to orientation and information services is the number of traffic decisions presented in the current Moose area. This is aggravated by the number of cars, RVs, busses, float trip vehicles with trailers and boats and pedestrians that all congregate at Moose during the main season. These moderate adverse impacts in the current location affect a large number of visitors for the duration of their stay in Moose and are somewhat mitigated by

time of day, season, and the expectation of services or resources at Moose. For many travelers, the only desire is to drive through Moose on the way to other parts of the park.

Proximity of Activities

Visitors who stop in at the present visitor center find minimal activities actually associated with the center. The only interpretive opportunities revolve around Menor's Ferry in the summer and snowshoe walks in the winter and an abbreviated video area. This is a minor adverse impact, as the current visitor center is not advertised as a hub of interpretive activities.

The current center has been degraded by a roof collapse and resultant reduction of usable exhibit, interpretive and lobby space by subsequent remodeling. The center has likewise benefited from a vastly increased book sales area. Impacts to those who come seeking the basics of park orientation, information and interpretation are moderate and adverse, while the impacts to those seeking shopping opportunities or educational and interpretive literature are minor and beneficial.

Conclusion

Under the no action alternative visitors would continue to experience moderate adverse effects from the present poor quality of service in a substandard facility. Visitors would continue to have trouble in finding the center and negotiating the number of traffic decisions and general congestion in Moose, particularly during the busy season. The mixing of visitors seeking mountain views, wildlife, and pleasure driving with commercial boating and fishing operations and the busy maintenance facility adjacent to public parking all combine to have a moderate adverse impact on what should be a park-like entry experience. If visitation continues to increase every year, as current trends indicate, the impacts on the visitor experience would become moderate and adverse. Visitors may choose to ignore the visitor center and interact with the park on their own terms. This could lead to an increase in accidents, non-compliance with rules and regulations, and other effects on resources that are associated with uninformed visitors.

The Effects of Alternative B on Visitor Experience

Ease of Locating Important Park Facilities and the Ability to Access Information and Orientation

Under this alternative, impacts related to the difficulty of locating the new facility would be identical to alternative A.

The opportunity presented by a new interpretive facility results in moderate beneficial impacts to the visitor experience at the visitor center. Those who seek administrative or business services would likewise be better served with a new facility. Combining the two in the same building presents the same moderate adverse impacts of the present building, those being appropriate hosting, meeting and greeting of the two functions, parking areas serving different purposes and the associated impacts of the entire park staff all being at the same place. The impacts in the short-term would be moderately adverse, as the park staff would be forced to operate with no headquarters or from temporary spaces for the duration of construction. Visitors would likewise be inconvenienced through the lack of a facility for the duration of construction. The Grand Teton Natural History Association would experience moderate short-term impacts from having their busiest sales area closed for the duration of construction. This would likewise have a moderate adverse impact on the interpretive operation by denying access to a high percentage of today's approximately \$100,000 of direct aid.

Convenience and Safety of Pedestrian and Vehicle Circulation

Impacts related to proximity to the main north south intersection and the Teton Park Road would be similar to alternative A. The impacts of congestion could be incrementally reduced by redesigning the entrances to parking areas.

Proximity of Activities

Impacts of this alternative would be similar to alternative A with the exception of making winter access to snowshoe routes incrementally worse. Opportunities to view the Teton Range exist but the close proximity of the maintenance facility and housing area would incrementally reduce the quality of the experience for most visitors. Access to other opportunities is similar to alternative A.

Ability to Enjoy Park Resources

The impacts related to enjoyment of resources are similar to alternative A. The short-term effects related to construction activities would be moderate. Large numbers of visitors would be denied critical resource and safety information, interpretation or orientation by the lack of a visitor facility. Those same visitors would be denied access to interpretive literature available at the current bookstore. These effects could be mitigated to a small degree by offering these services at a temporary location in the Moose area. These impacts could also be mitigated by phasing of the construction of the facility, though phasing would also lengthen the duration of the construction and disruption.

Conclusion

This alternative would result in negligible improvement over alternative A. The effects of a reduction in congestion because of the redesign of the entrances to parking areas would clarify turning decisions.

Visitors would experience a moderate beneficial effect because of the opportunities to access enhanced interpretive facilities.

If unmitigated the short-term effects of the simultaneous construction of both administrative and interpretive facilities on the visitor would be adverse and moderate. The Grand Teton Natural History Association would experience moderate short-term impacts from having their busiest sales area closed for the duration of construction. This would likewise have an impact on the interpretive operation by denying access to a high percentage of today's approximately \$100,000 of direct aid. These effects could be mitigated by relocating essential visitor services to a temporary facility.

The Effects of Alternative C on Visitor Experience

Ease of Locating Important Park Facilities and the Ability to Access Information and Orientation

Under this alternative, impacts related to the difficulty of locating the new facility would be increased by locating the facility away from the road's edge to the other side of the road and behind a grove of cottonwood trees.

The opportunity presented by a new interpretive facility is similar to alternative B and further enhanced by separating the administrative and visitor service functions. Those seeking business or administrative assistance will find what they need at the administrative site, while visitors seeking services, information, or orientation will find what they need at the visitor center. By retaining the existing facility while constructing the new center, the impacts associated with closing either operation or moving to temporary quarters are reduced. Moving the visitor function further west will prove a minor adverse impact to the Grand Teton Natural History Association operation by requiring vehicle deliveries of immediate stock.

Convenience and Safety of Pedestrian and Vehicle Circulation

Compared to alternative B the impacts of congestion would be further reduced by removing one left turn opportunity and exchanging it for another further along the road but outside the currently

congested traffic pattern. Other minor beneficial impacts would arise from the removal of the post office, store and parking lot with their associated customers and traffic, moving the administrative parking to an area further off the road and giving boat parking its own junction and parking lot rather than sharing with the visitor center parking. The traffic associated with The Murie Center would be incidental.

The relocation of the Moose-Wilson Road junction even further to the north would reduce the crowded, hectic feeling resulting in minor beneficial impacts. Access to the visitor center from the Moose-Wilson Road becomes more awkward by requiring those who arrive via the Moose-Wilson Road to go through a second entrance station (Granite Canyon entrance is the first at the south end of the Moose-Wilson Road) to get to the visitor center, compared to just crossing the street as presently. Likewise, those wishing to drive south on the Moose-Wilson Road would have to go through the entrance to get to the junction. This change would impact both visitors and entrance station staff at a minor and adverse level.

The Proximity of Activities

This alternative exchanges an opportunity to experience and interpret a sagebrush meadow site with difficulties of accessing Menor's Ferry and riparian areas. As the appeal of nature walks and or other guided activities in the sagebrush community have proven unsuccessful while Menor's Ferry is quite popular, this becomes a minor adverse impact.

Without the Moose Village Store, visitors wishing to purchase souvenirs, convenience items or snacks would need to drive to Moose Enterprises. Grand Teton Lodge Company river fishing trips would have to be booked from another Grand Teton Lodge Company location. Local residents, including park employees, would not have the convenience of a store located near the post office.

A greater selection of facilities and services, including gasoline, is available nearby at Moose Enterprises. However, that area is congested and may be less convenient. Because it is a private enterprise there is no guarantee that similar services will continue there in the future.

The Jenny Lake Store carries a greater range of merchandise and food items and is located 8 miles north on the Teton Park Road. There is a smaller selection of fishing tackle. The Jenny Lake area is highly congested during summer with limited parking. Unless a visitor was planning to spend time in the Jenny Lake Area, it would not be practical to stop at the Jenny Lake Store just for convenience items. On balance the loss of the Moose Village Store would present a minor adverse impact.

Opportunities to view the Teton Range exist but the close proximity of the Teton Park Road and Moose developed area would cause a negligible reduction in the quality of the experience for most visitors.

Conclusion

This alternative would result in moderate beneficial impacts to traffic and congestion by eliminating one left turn and the associated parking and traffic at the post office and store, separating boat uses to their own lot and intersection and moving other turning opportunities further west. Minor adverse impacts would result from relocating the Moose-Wilson Road and obligating those who arrive by that road to pass through the entrance to get to the visitor center, and those who wish to drive the road arriving from the south, to pass through the entrance first. Improvements would be realized by separating uses between administrative and visitor services. Access to new resource opportunities at a more natural site would present moderate and beneficial impacts. The impacts on access to Menor's Ferry would be minor and adverse. The

impacts of retaining all existing services at the current facility, even in their degraded states, while construction takes place are moderate and beneficial.

The Effects of Alternative D (Preferred Alternative) on Visitor Experience

Analysis of the Ease of Locating Important Park Facilities and the Ability to Access Information and Orientation

Under this alternative, impacts related to the difficulty of locating the new facility would be the same as alternative C. The building would be located off the road and screened by riparian vegetation as visitors come off the bridge. As visitors approach the various intersections the building would become visible.

The opportunity presented by a new interpretive facility is similar to alternative B. The impacts related to separating interpretive and administrative functions, retaining the current facility during construction and Grand Teton Natural History Association operations are similar to alternative C.

The separation of the parking for the visitor center from the facility itself would present a minor negative impact from visitors seeking the visitor center, walking into the administrative facility and then being redirected.

Analysis of the Convenience and Safety of Pedestrian and Vehicle Circulation

Under this alternative, the provision of a pedestrian trail and tunnel as well as other aids to travel such as handicap parking and winter parking at the visitor center present moderate beneficial impacts for pedestrians, balanced by minor negative impacts to those who will be inconvenienced by a walk to the visitor center.

Analysis of the Proximity of Activities

The effects related to proximity to the US Highway 191 intersection and the Teton Park Road would be similar to B. The impacts of congestion are somewhat less than A and B because of the relocation of the Moose-Wilson Road and the elimination of the current post office parking and facilities. Congestion at the two intersections would be somewhat greater than in alternative C. Benefits similar to alternative C accrue from separation of the administrative and visitor functions. The eventuality of the administrative function moving into temporary quarters during construction is moderately adverse, requiring the administrative staffs to operate out of temporary offices during construction of the new administrative headquarters.

Access to riparian areas is only slightly affected, though access to a wide variety of habitats is a moderate beneficial impact. This alternative offers improved access to the presently used snowshoe walk route, compared to all other alternatives, a minor beneficial impact.

Opportunities to view the Teton Range exist and are improved by locating the visitor facilities back from the roadway to the greatest extent possible.

Conclusion

This alternative slightly reduces impacts from ease of location when compared to A and B, resulting in minor adverse effects. Traffic and congestion impacts are improved when compared to A and B, but slightly worse than C, resulting in minor adverse effects overall. Minor adverse impacts would result from relocating the Moose-Wilson Road and obligating those who arrive by that road to pass through the entrance to get to the visitor center, and those who wish to drive the road arriving from the south, to pass through the entrance first.

The benefits of retaining all existing services at the current facility, even in their degraded states, while construction takes place are moderate and beneficial. The impacts of improvements to

visitor services are moderate and beneficial, while access to a wide variety of habitats is a moderate beneficial impact.

The Effects of Alternative E on Visitor Experience

Ease of Locating Important Park Facilities and the Ability to Access Information and Orientation

This alternative minimizes the impacts of trying to locate the visitor center, as it would be visible from the main highway and any intersections would be more obvious and easier to sign than other proposals. Impacts would be moderate and beneficial.

Convenience and Safety of Pedestrian and Vehicle Circulation

The location is also closest to the intersection with US Highway 191, minimizing the impacts associated with diverting more through traffic to the Teton Park Road. This alternative relieves traffic and congestion at the current site by moving visitor traffic related to the visitor center out of the immediate Moose area. The traffic that formerly came into the current parking lot would be directed into the new development, causing additional congestion at the Dornan's intersection.

Compared to the other alternatives, this proposal has the beneficial effect of relieving congestion in the area of headquarters while increasing it at Dornan's. Removing the visitor center traffic from Moose removes one major conflicting use from the list of maintenance and administrative traffic, pedestrians, float and fishing trip parking, Murie Center patrons and post office and store patrons, Moose-Wilson Road users, and through traffic to the inside road. The major benefit from relocating this use would far outweigh the minor increase in congestion at the Dornan's intersection. The combining of the post office with a new administrative facility eliminates another increment of traffic on the south side of the road, though that is likely balanced by boat launching and parking on the south side. The elimination of some of the roadside parking lot as well as the separation of boat parking eliminates another congestion point on the north side of the road.

Proximity of Activities

The location adjacent to a riparian area offers opportunities for access to the river and the riparian community, as well as sagebrush flats. The impacts are similar to alternatives A and B, an improvement over C, and less beneficial than D. Access to a winter snowshoe route would be similar to A and B, though a new route would have to be pioneered. Access to Menor's Ferry would be the most difficult of all alternatives, posing a minor impact to users who generally drive to the site now, while requiring transportation for the staff. The impact on the Grand Teton Natural History Association operations would be similar to C and D, though the drive is incrementally longer.

The effects of separation of the administrative and visitor functions would be similar to alternative C. Those impacts associated with the maintenance function would be almost eliminated, while the meeting, greeting and redirection of administrative traffic would be reduced. With two separate new facilities being considered, the opportunity to maintain visitor functions through the period of construction is enhanced, because visitors would still have access to the current visitor center during construction. The eventuality of the administrative function moving into temporary quarters during construction is moderately adverse, requiring the administrative staffs to operate out of temporary offices during construction of the new administrative headquarters.

Opportunities to view the Teton Range under this alternative are exceptional and would provide a high quality viewing experience for most visitors.

Conclusion

Alternative E presents moderate beneficial impacts combined with minor negative impacts in the area of traffic and congestion, improves the ability of visitors to find the visitor center and make decisions about routes, imposes minor adverse impacts on users of and staff for Menor's Ferry while offering diminished resource opportunities compared to alternative D, and presents minor adverse impacts to Grand Teton Natural History Association operations. Menor's Ferry access is the most impacted of all alternatives.

Opportunities to view the Teton Range under this alternative are exceptional and would provide a high quality viewing experience for most visitors.

The Effects of the Alternatives on Natural Soundscapes

Methodology

The primary sources of unnatural sound in the Moose area are associated with aircraft and motor vehicles, primarily automobiles, busses, snowplows and other road maintenance equipment. This analysis will therefore concentrate on the levels of audibility of these vehicles and their effect on natural soundscapes, visitor experiences, and employee effectiveness.

Motor Vehicles

Levels of audibility for this analysis were collected by Hanson, Miller, Miller and Hanson (HMMH) an acoustical engineering firm. These data were collected initially for the NPS as baseline information to be used in *the Final Environmental Impact Statement for the Winter Use Plan for Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway (2000)*. In order to clearly describe the existing soundscape, reference noise emission levels were collected. Reference noise emission levels in this case are the maximum pass-by sound level of individual vehicles (Menge 1998).

The rate at which sound drops off with distance by frequency was taken from the Federal Highway Administration (FHWA) Traffic Noise Model (TNM's) sound propagation algorithms. The TNM also includes tree zones as an input type. Because the study area is a mixture of open sagebrush and forested areas, distances to the limit of audibility are provided for both. The vegetation type is important because the effect of trees is to reduce propagating sound levels by 5dB to 10 dB over longer distances. The losses are far less for low frequencies than for high frequencies. Most of the terrain throughout the study area is rolling or nearly flat. This analysis used background sound levels for winter. This is appropriate for two reasons. First, winter is the season when sound is likely to travel the farthest, therefore representing the worst-case scenario for distances to the limits of audibility. Second, the Moose area generally experiences winter conditions for more than 6 months of an average year.

The limits of audibility for each of the alternatives are presented graphically in figure 7.

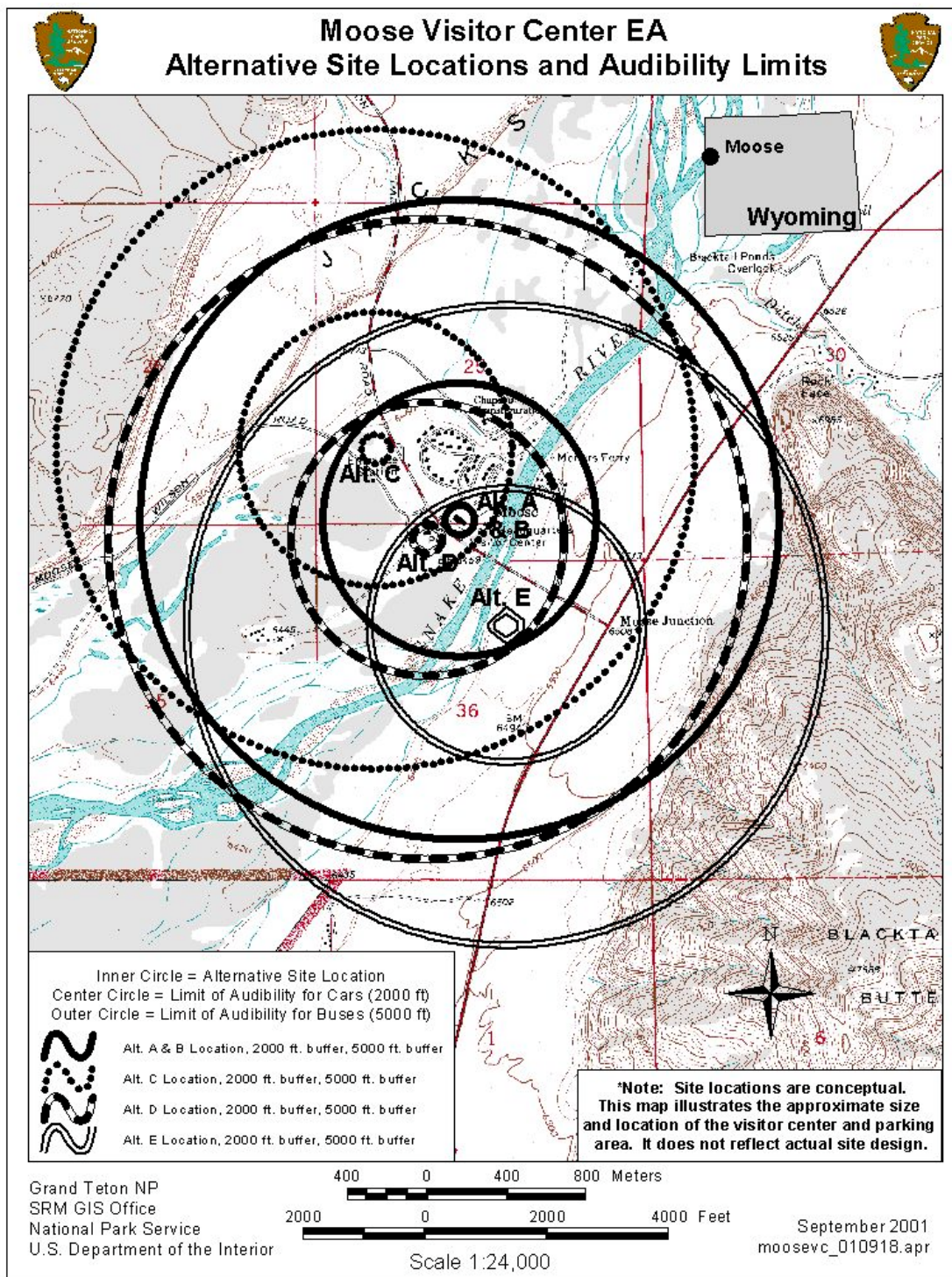


Figure 7

Aircraft Sound

Recently a study was completed by BridgeNet International Inc. (BridgeNet 2001) to assess the effects of restricting stage 2 aircraft at the Jackson Hole airport. Base line information on the number and flight pattern of aircraft that fly over the project area was obtained from that study.

The Jackson Hole Airport Board operates the Jackson Hole Airport with Grand Teton National Park pursuant to an agreement with the United States Department of the Interior. The agreement was entered into pursuant to the Airports in the Parks Act, 16 U.S.C. § 7a-7e. The use agreement imposes a number of noise abatement requirements including; limiting aircraft approaches from and departures to the north; and encouraging pilots taking off to, or approaching from, the north to maintain a course east of US Highway 191 north of Moose (Jackson Hole Airport Board 2001).

Table 24 describes the definitions of each impact category used to describe the relative effects of each alternative on the soundscape.

Table 24. Definition of impacts to the soundscape.

Impact Category	Definition
Negligible	An action that would affect very few visitors and would cause a barely perceptible change in the level and area of audibility of aircraft and motor vehicle sound.
Minor	An action that would affect relatively small numbers of visitors or residents and would minimally alter levels and area of audibility of aircraft or motor vehicle sound.
Moderate	An action that would cause measurable affects on residents and visitors and would affect a measurable change in the level and area of audibility of aircraft or motor vehicle sound
Major	An action that would be readily apparent throughout the area by a large number of visitors and residents and would significantly change the level and area of audibility of aircraft or motor vehicle sound.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

The Effects of Alternative A on Soundscapes

Alternative A would continue the existing use and use patterns within the Moose area.

Impact Analysis

Aircraft Sound

Approximately 15% of the daytime operations and 3 to 5% of nighttime operations at the Jackson Hole Airport would continue to be routed directly over the Moose area. Visitors who choose to visit the visitor center and particularly those who participate in outdoor activities in and around the Moose area would routinely experience the sound of low flying aircraft. Sound from aircraft would continue to cause minor to moderate adverse effects on visitor experiences at the visitor center, at interpretive programs and activities such as hiking, skiing and snowshoeing in the vicinity of Moose.

Motor Vehicle Sound

Sound from motor vehicles would continue to be audible for approximately 2,100 feet from roadways and parking areas in the Moose area. Busses and large vehicles would be audible from existing roadways for approximately 5, 500 feet (see figure 7). The sound of motor vehicles

would be constantly audible (at some level) during daylight hours. There would be no change in the existing limits of audibility of motor vehicles under alternative A.

Cumulative Impacts

The area of concern in respect to natural soundscapes consists of the places within the project area from which unnatural sounds from aircraft noise and motor vehicles are audible. Alternative A would result in minor to moderate adverse impacts from aircraft noise and negligible impacts from motor vehicle sound. These impacts would have a negligible additive impact on the overall natural soundscape of the park compared to other sources of unnatural sound.

Conclusion

The effects of aircraft sound on visitor experience under alternative A would continue to be direct, adverse and minor to moderate. The effects of motor vehicle sound on visitors to the area would continue to be negligible. If, in the future, motor vehicle and aircraft numbers should increase, a corresponding increase in the level of audibility and the amount of time these vehicles are audible would be expected.

The Effects of Alternative B on Soundscapes

Aircraft Sound

The effects on the soundscape of alternative B would be similar in magnitude and duration to alternative A.

Motor Vehicle Sound

Under alternative B the effects of motor vehicle sound on the soundscape and on visitor experience would be similar in magnitude and duration to those described in alternative A. Under alternative B there would be no change from alternative A in the distance to the limit of audibility of motor vehicle sounds outside the existing Moose area.

Cumulative Impacts

Same as A.

Conclusion

As in alternative A, the effect of motor vehicle and aircraft sound on visitor experience, would continue to be direct, short-term, adverse and minor to moderate. The actions proposed in this alternative would not increase the distance to the limit of audibility of motor vehicle sounds outside the existing Moose area.

The Effects of the Alternative C on Soundscapes

Aircraft Sound

Under alternative C the new visitor center would be located to the west of the existing visitor facility. Of all alternatives considered, this location is furthest from the airway approach to Jackson Hole Airport (.40 miles). This would result in negligible to minor improvements to visitor experiences by lowering the level of audibility of aircraft sound. The effect of aircraft sound on all other visitor experiences would be similar to those described in alternative A.

Motor Vehicle Sound

Under alternative C the proposed visitor center would occupy an area that is currently undeveloped. Because this alternative would extend the total area of development by

approximately 6 acres (west) a corresponding increase in the distance to the limits of audibility of vehicle sound within the Moose area would result.

Because the proposed relocation of the Moose-Wilson Road would connect two pieces of existing roadway this action would not change the distance to the limits of audibility of motor vehicle sound from the Moose area. The effect of motor vehicle sound on all other visitor experiences would be similar to those described in alternative A.

Cumulative Impacts

The area of concern in respect to natural soundscapes consists of the places within the project area from which unnatural sounds from aircraft noise and motor vehicles are audible. Alternative C would result in negligible to minor improvements from lowering of aircraft sound due to the location of the visitor center. Impacts from motor vehicle sound would be the same as alternative A. These impacts would have a negligible additive impact on the overall natural soundscape of the park compared to other sources of unnatural sound.

Conclusion

There would be negligible to minor improvements to visitor experiences by lowering the audibility of aircraft sound experienced by park visitors in the new visitor center. These improvements would occur because the new facility would be located further from the identified runway approach for Jackson Hole Airport. The effect of motor vehicle sound on visitor experiences would be similar to those described in alternative A.

The Effects of the Alternative D (Preferred Alternative) on Soundscapes

Aircraft Sound

Alternative D proposes to locate the visitor center southeast of the current location of the Moose Village Store and Post Office. Because the distance to the approach of runway 36 is similar to the existing visitor center, the effects of aircraft sound on visitor experience would be the same as those described in alternative A.

Motor Vehicle Sound

Under this alternative, the new visitor facility would be located 500-1,000 feet from the Teton Park Road. Parking for the new facility would be located across the Teton Park Road at the site of the existing visitor center. Visitors would access the facility via footpath. These actions would result in a minor to moderate improvement in the visitor experience by lowering the level of audibility of motor vehicles for visitors inside and near the new facility. Because this alternative would extend the total area of development by approximately 3 acres (southeast) a corresponding increase in the distance to the limits of audibility of vehicle sound would result.

The effects of relocating the Moose-Wilson Road would be similar to those described in alternative C. The effect of motor vehicle sound on all other visitor experiences in the Moose area would be similar to those described in alternative A.

Cumulative Impacts

The area of concern in respect to natural soundscapes consists of the places within the project area from which unnatural sounds from aircraft noise and motor vehicles are audible. Impacts from aircraft noise in Alternative D would be the same as alternative A. There would be minor to moderate improvements to visitor experience from locating the visitor facility farther from the road and locating parking away from the road. These impacts would have a negligible additive impact on the overall natural soundscape of the park compared to other sources of unnatural sound.

Conclusion

There would be little change in the level of audibility of aircraft noise at the proposed visitor center location under this alternative. By locating the new visitor facility farther from the Teton Park Road and locating the parking away from the road, the audibility of motor vehicles would decrease, resulting in minor to moderate improvements to the visitor experience.

The Effects of the Alternative E on Soundscapes

Aircraft Sound

Under alternative E, visitors to the proposed visitor center would experience greater adverse effects from aircraft sound. The new facility would be located directly under the approach airway for runway 36 at the Jackson Hole Airport. The effect of aircraft sound on all other visitor and employee experiences would be similar to those described in alternative A.

Motor Vehicle Sound

Under alternative E the visitor center would be located on the southeast bank of the Snake River. Because of the proximity of the new facility to US Highway 191 and the Snake River a negligible increase in the distance to the limit of audibility would occur. Visitors recreating near the new facility would experience a minor increase in the audibility of vehicle sound. Fishermen and boating enthusiasts accessing the Snake River would also notice an increase in human caused sound. The effect of motor vehicle sound on all other visitor and employee experiences in the Moose area would be similar to those described in alternative A.

Cumulative Impacts

The area of concern in respect to natural soundscapes consists of the places within the project area from which unnatural sounds from aircraft noise and motor vehicles are audible. Impacts from aircraft noise in Alternative E would be moderate and adverse to visitors, while impacts from motor vehicles would be negligible. These impacts would have a negligible additive impact on the overall natural soundscape of the park compared to other sources of unnatural sound.

Conclusion

Visitors to the new facility, as proposed in alternative E, would experience an increase in the audibility of aircraft sound when compared to alternative A. This would result in direct short-term moderate adverse impacts on the visitor experience. Fishermen and boaters on the Snake River would also experience increased levels in man-made sound. The effects of motor vehicle sound on visitor experience under this alternative would be negligible.

The Effects of the Alternatives on Visual Quality

Methodology

The following criteria were used to assess the effects of the alternatives on visual quality. Beneficial effects are determined to be those that minimize the visual effects of parking areas, housing areas and maintenance facilities. Beneficial effects on visual quality also include actions whose design blends facilities into the surrounding landscape, as well as those that do not dominate or compete with natural park features such as the Teton Range.

Adverse effects on visual quality are those that dominate or compete with the park's natural features.

The magnitude of the effect on visual quality will be determined by two factors—the number of park visitors that will be affected and the amount of time that they will be affected.

Table 25. Definition of impacts to visual quality.

Impact Category	Definition
Negligible	An action that would affect very few visitors and minimally alter views of the scene.
Minor	An action that would affect relatively small numbers of visitors and minimally alter the existing view of the natural scene.
Moderate	An action that would cause measurable affects on a relatively moderate number of visitors or affect a moderate change in the existing view.
Major	An action that would cause measurable affects on a high number of visitors or affect a major change in the existing view.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

Travel Routes and Viewpoints

Travel routes and viewpoints are used to evaluate the impacts of the alternatives on visual quality. It is from the travel routes and viewpoints that measures are made on how many visitors would be impacted and the length of time their views would be impacted. The criteria for determining which views are most important include those areas which have special significance such as views of the Teton Range or areas that are visible to a moderate or large number of viewers. The amount of time a proposed action can be seen is also an important aspect of assessing effects on visual resources. This is because the longer a management activity is in view, the more likely it is that it will be noticed or have an effect on the viewer. Travel routes of primary importance are U.S. Highway 191, Teton Park Road, the Snake River, and The Chapel of the Transfiguration Road (Table 26). The project area is visible for long periods of time from these four travel routes. Table 27 describes a use area visible within the project area that has high volumes of vehicle and pedestrian traffic. Table 28 lists traffic counter totals from the Teton Park Road, US Highway 191, Highway 26, and the Moose-Wilson Road.

Table 26. Travel routes of primary importance.

Viewpoint	Travel Route	Criteria
1	US Highway 191	High use, views of long duration
2	Teton Park Road	High use, views of long duration
3	Snake River	Moderate use, views of long duration
4	The Chapel of the Transfiguration Road	Moderate use, area of importance

Table 27. Use areas of primary importance.

Viewpoint	Use Areas	Criteria
5	Moose-Wilson Road/Post Office/Murie intersection	High use, views of long duration

Table 28. 1997-2000 Highway counters average.

Teton Park Road-Moose Entrance Northbound	Teton Park Road-Moose Entrance Southbound	Highway 191-Gros Ventre Junction Northbound	Highway 26 (Moran Junction) West Southbound	Moose-Wilson Road
277,525	275,024	1,249,017	286,921	124,635

The Effects of Alternative A on Visual Quality

Impact Analysis

Implementing the no action alternative would result in the continuation of existing conditions and trends. The current visitor center and administrative building occupy approximately 31,000 square feet within the 9-acre visitor center and maintenance area complex. The existing parking area occupies approximately 2.5 acres.

For an inventory of facilities that are currently visible from each of the viewpoints discussed in the analysis, the reader is referred to the Affected Environment Visual Quality section of this document.

Under alternative A there are no new changes in the existing visual quality of the Moose area. The two-story maintenance building would continue to affect views of the Teton Range minimally from US Highway 191. The parking area and existing visitor center and administrative facilities would continue to affect the views from the Teton Park Road. The employee housing area would continue to be highly visible from the Teton Park Road and The Chapel of the Transfiguration Road. The Moose Village is readily recognizable as an area of visitor services and development to most visitors.

Cumulative Impacts

The area of concern with respect to visitor experience is the Moose developed area. The role that the visitor center plays in the Moose area is of a dual nature, being central to how people experience the park in this area. The center can detract from the experience by its visual appearance and location, and it can enhance the experience by provided desired services, information and visitor programs. The degree to which either impact exists drives visitor experience in terms of the total cumulative impact of development in the Moose area.

In alternative A, there is negligible impact over and above the current total development in the area. This alternative would not reduce the cumulative impact on visitor experience in the area from the standpoint of traffic circulation, co-located facilities and existing potential for confusion.

Conclusion

Little change would be visually evident, and no new impacts would occur to views of the Teton Range. Minor to moderate adverse effects on the visual quality would continue to occur from the high visibility of parking areas and the Moose housing area. Rehabilitation of the existing

building would provide minor improvements to visual quality. Impacts on the visual resources of the Moose area are generally minor under the no action alternative.

Visual resources are intrinsic to visitor experience, visitor enjoyment and park values. Because the impacts on visual resources described in this alternative are negligible, there would be no impairment of visual resources or their conservation.

The Effects of Alternative B on Visual Quality

Impact Analysis

Implementing this alternative would address concerns for the limited disturbance of resources by constructing a new 2-story facility on the site of the existing parking and visitor center/administration building.

The two-story structure would cause minor to moderate adverse effects on views of the Teton Range when seen from viewpoint 2 (Table 26). However, relocating the parking behind the visitor center building would result in moderate beneficial improvements. The ridgeline of the two-story structure would be visible in the middle ground from viewpoints one, two, three, four and five.

Cumulative Impacts

Same as A.

Conclusion

The impacts of alternative B on the visual quality are minor and adverse. Some beneficial effect would result from locating the parking area to the rear of the new building. The affect of an additional multi-story structure in the Moose development is minimal based on the proximity to the existing structure.

Visual resources are intrinsic to visitor experience, visitor enjoyment and park values. Because the impacts on visual resources described in this alternative are negligible, there would be no impairment of visual resources or their conservation.

The Effects of Alternative C on Visual Quality

Impact Analysis

Under alternative C, the proposed visitor center would be located southwest of the Moose entrance station location. Approximately 300 feet of new road would connect the new visitor center with the Teton Park Road.

Under this alternative, the proposed new construction would not affect views of the Teton Range from any of the analyzed viewpoints. The new visitor center would be visible from the Teton Park Road and would affect an area that is currently undeveloped. Moderate improvements to the visual quality would occur from the rehabilitation of the parking area at the post office and the Moose area store. The relocation of the Moose-Wilson road would result in minor adverse effects when seen from The Chapel of the Transfiguration intersection. Although the roadway would be barely visible from the Teton Park Road, the cars would result in a visual intrusion where none currently exists.

The removal of development from the road corridor provides an opportunity to screen the existing structures and rehabilitate areas. The relocation of the Moose-Wilson Road would redirect the focus of visitors away from the Moose development.

Cumulative Impacts

Alternative C reduces the total cumulative impact on visitors by separating the visitor center and administrative functions and reconfiguring travelways to facilitate visitor needs, while reducing visual impacts in the area.

Conclusion

Impacts on the visual quality under alternative C are negligible. The removal of development from the road corridor would minimize the adverse effects on visual quality and the rehabilitation of the Moose-Wilson Road. Siting the new facility back from the roadway would provide an opportunity to blend with the natural setting.

Visual resources are intrinsic to visitor experience, visitor enjoyment and park values. Because the impacts on visual resources described in this alternative are negligible, there would be no impairment of visual resources or their conservation.

The Effects of Alternative D (Preferred Alternative) on Visual Quality

Impact Analysis

No new impacts to the view of the Teton Range would result from placing the new visitor center and trail on the south side of the road, in a meadow/forest complex. Visitors would experience moderate benefits from improved views of the Teton Range as a result of placing the new visitor center in an area with open views to the west. Relocation of the post office and store would further improve views of the Teton Range from the visitor center. Minor improvements to visual quality would result from expansion and redesign of the visitor center parking lot. The effects of the Moose-Wilson Road reroute would be similar to alternative C.

Cumulative Impacts

Same as C.

Conclusion

Moderate visual improvements would result from placement of the visitor center in a location with views of the Teton Range. Minor benefits would result from redesign of visitor and administrative parking. The effects of the Moose-Wilson Road reroute would be similar to alternative C. No new impacts would occur to views of the Teton Range from any of the viewpoints analyzed.

Visual resources are intrinsic to visitor experience, visitor enjoyment and park values. Because the impacts on visual resources described in this alternative are minor, there would be no impairment of visual resources or their conservation.

The Effects of Alternative E on Visual Quality

Impact Analysis

This alternative would site a new visitor center on the bench southeast of the Snake River. A new road would connect the visitor center to the Teton Park Road near Dornan's.

The new visitor center would be visible from US Highway 191 (viewpoint 1). The facility would introduce forms, colors, textures and lines not currently present at this location. Architecturally using the natural contours that are created by terrain adjacent to the Snake River could minimize impacts. Landscape contouring such as the construction of berms to hide parking facilities would mitigate some adverse effects but they would not be eliminated. The new visitor facility would also be visible from the Teton Park Road (viewpoint 2).

The new visitor center at this location would also be visible by recreationists and fishermen using the Snake River (viewpoint 3). Architecturally, the minor adverse impacts could be minimized but not eliminated.

Cumulative Impacts

Alternative E would enhance visitor experience in respect to services and their accessibility, but detract from visual quality in the area.

Conclusion

Affects of alternative E on the visual quality would be generally long-term moderate and adverse. The effect of expanding development to the southeast side of the Snake River introduces an element into the viewshed that would affect the view of the Teton Range for a large number of viewers. Impacts from developing this area would be seen from several viewpoints. Although architecturally visual impacts can be minimized, they can not be eliminated.

Visual resources are intrinsic to visitor experience, visitor enjoyment and park values. Because the impacts on visual resources described in this alternative would be moderate, there would be no impairment of visual resources or their conservation.

The Effects of the Alternatives on Cultural Resources

Methodology

Impacts to Cultural Resources and §106 of the National Historic Preservation Act: In this environmental assessment, impacts to historic structures are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both NEPA and §106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts to archeological resources and the cultural landscape were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either *adverse effect* or *no adverse effect* must also be made for affected, National Register eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register, e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is

an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

Table 29. Definition of Impacts to Cultural Resources.

Impact Category	Definition of Impact
Negligible or No effect	There is no effect of any kind (that is, neither harmful nor beneficial) on the historic property
Minor	There could be an effect, but the effect would not be harmful to those characteristics that qualify the property for inclusion in the National Register
Moderate	There could be an effect, but the effect would not be harmful to those characteristics that qualify the property for inclusion in the National Register;
Adverse	There could be an effect and that effect could diminish the integrity or characteristics that qualify the property for inclusion in the National Register.
Impairment	A major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park or; (3) identified as a goal in the strategic plan or other relevant NPS planning documents.

Section 106 of the National Historic Preservation Act, as amended, provides working definitions on the way that federal projects could affect cultural resources. If a project changes in any way the characteristics that enabled the cultural resource to qualify for listing in the National Register of Historic Places, for better or worse, the project is considered to have an “effect” on the resource. There are three possible ways an undertaking can effect a cultural resource:

No effect: There is no effect of any kind (that is, neither harmful nor beneficial) on the historic property;

No adverse effect: There could be an effect, but the effect would not be harmful to those characteristics that qualify the property for inclusion in the National Register; or

Adverse effect: There could be an effect, and that effect could diminish the integrity of such characteristics.

The Effects of Alternative A on Cultural Resources

Impact Analysis

The National Park Service would continue to maintain the existing visitor center and museum objects on exhibit on a cyclic basis.

Cumulative Impacts

Park visitation has increased dramatically over recent decades and this trend is expected to continue into the future. The increase in visitation will have cumulative impacts to the sustainability of the building and museum objects on exhibit due to more foot traffic in the building and environmental fluctuations in the building including temperature and relative humidity.

Conclusion

No adverse effect on cultural resources.

The Effects of Alternative B on Cultural Resources

Impact Analysis

There would be no effect to historic structures in Alternative B. Removing the existing visitor center and constructing a new building and parking area on the same site will not impact previously identified archeological sites in the area. Following the guidelines established in the Museum Handbook, there would be no effect to museum objects on exhibit during removal, storage, and reinstallation.

Cumulative Impacts

Park visitation has increased dramatically over recent decades and this trend is expected to continue into the future. As visitation to the Moose area increases, visitor impacts would continue to increase, possibly resulting in the unearthing of artifacts and potential degradation of undiscovered archeological sites. The increase in visitation will have cumulative impacts to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations in the building including temperature and relative humidity.

Conclusion

No effect to historic structures since the existing visitor center has been determined ineligible for listing in the National Register.

Minor short-term impacts or no adverse effect to museum objects during the move. Minor impacts or no adverse effect to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations.

The Effects of Alternative C on Cultural Resources

Impact Analysis

Three archaeological sites are located near the project area. As stated previously, one large historic trash scatter (48TE1482) as well as two prehistoric sites were identified in this area. The prehistoric sites include one small ephemeral lithic scatter (48TE398). The other prehistoric site (48TE1483) consists of miscellaneous lithic debris. The survey team hypothesized that the site was used only once for lithic procurement.

The historic trash scatter (48TE1482) contained several hundred artifacts, including glass, metal, and ceramic fragments. The archaeologists also identified several rectangular concrete foundations, possibly associated with the former Moose General Store and gas station, which the National Park Service removed in 1958. This site is most proximal to the proposed site of the visitor center and parking lot though at least 100 yards away. The visitor center site proposed in this alternative is bisected by an old road alignment that diverges from the Moose-Wilson Road and leads directly to the current Moose entrance kiosks.

Sites 48TE1483 and 48TE398 would be proximal to the proposed Moose-Wilson Road reroute.

Because of the reconnaissance nature of the archaeological survey cited above, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments will be needed to determine whether these sites are eligible for listing in the National Register of Historic Places. An intensive archaeological survey will be required prior to beginning construction to identify possible additional sites and to determine whether these are eligible for listing in the National Register of Historic Places. Should the sites be determined to be significant and eligible for listing in the National Register, consultation with the Wyoming SHPO and Native American governments would be required to determine whether the project

constitutes a “no adverse” or “adverse effect.” If adverse, a mitigation plan would need to be developed, again in consultation with the Wyoming SHPO and affiliated tribal governments.

There will be no effect to historic structures. Constructing a new building and parking lot will impact previously recorded archeological sites in the area due to increased ground disturbance related to construction. Rerouting the Moose-Wilson road could impact potentially National Register eligible archeological sites. Following the guidelines established in the Museum Handbook, there would be no effect to museum objects on exhibit during removal, storage, and reinstallation.

Cumulative Impacts

Park visitation has increased dramatically over recent decades and this trend is expected to continue into the future. As visitation to the Moose area increases, visitor impacts would continue to increase, possibly resulting in the unearthing of artifacts and potential degradation of undiscovered archeological sites. The increase in visitation will have cumulative impacts to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations in the building including temperature and relative humidity.

Conclusion

Possible minor impacts or no adverse effect to archeological sites determined ineligible for listing in the National Register. Possible adverse impact or adverse effect on archeological sites determined eligible for listing in the National Register.

No effect to historic structures since the existing visitor center has been determined ineligible for listing in the National Register.

Minor short-term impacts or no adverse effect to museum objects during the move. Minor impacts or no adverse effect to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations.

The Effects of Alternative D (Preferred Alternative) on Cultural Resources

Impact Analysis

A surface survey of the proposed site was completed by walking several parallel transects running in a southwest to northeast direction covering a site bounded on the north by the Teton Park Road, on the east by the Snake River, and on the south and west sides by the Murie Ranch Road and the Moose-Wilson Road. This survey located three historic pits of unknown use or origin, one foundation, two abandoned two-track roads, and isolated areas of historic debris, none in high concentrations. One obsidian corner-notched projectile point was located. In addition one prehistoric lithic scatter was located adjacent to the Murie Ranch Road; however this is outside the project area. All but the lithic scatter and the projectile point are likely associated with the STS Dude Ranch operation or the Leonard Altenreid/Herman C. Ericsson homesteads. The lithic scatter was located and noted, but has not been recorded to date and further research is needed.

Because of the reconnaissance nature of the archaeological survey cited above, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments will be needed to determine whether these sites are eligible for listing in the National Register of Historic Places. This survey would be undertaken before any ground-disturbing activity. Should this alternative be selected, an intensive archaeological survey will be required to identify possible additional sites and to determine whether these are eligible for listing in the National Register of Historic Places. Should the sites be determined to be significant and eligible for listing in the National Register, consultation with the Wyoming SHPO and Native

American governments would be required to determine whether the project constitutes a “no adverse” or “adverse effect.” If adverse, a mitigation plan would need to be developed, again in consultation with the Wyoming SHPO and affiliated tribal governments.

There would be no effect to historic structures in Alternative D. Constructing a new visitor center, administrative building, parking lots, walking path and underpass, as well as rerouting the Moose-Wilson Road, could impact potentially National Register eligible archeological sites in the area. Following the guidelines established in the Museum Handbook, there would be no effect to museum objects on exhibit during removal, storage, and reinstallation.

Cumulative Impacts

Park visitation has increased dramatically over recent decades and this trend is expected to continue into the future. As visitation to the Moose area increases, visitor impacts would continue to increase, possibly resulting in the unearthing of artifacts and potential degradation of undiscovered archeological sites. The increase in visitation will have cumulative impacts to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations in the building including temperature and relative humidity.

Conclusion

Possible minor impacts or no adverse effect to archeological sites determined ineligible for listing in the National Register. Possible adverse impact or adverse effect on archeological sites determined eligible for listing in the National Register.

No effect to historic structures since the existing visitor center has been determined ineligible for listing in the National Register.

Minor short-term impacts or no adverse effect to museum objects during the move. Minor impacts or no adverse effect to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations.

The Effects of Alternative E on Cultural Resources

Impact Analysis

A recent University of Wyoming archaeological survey identified one site (48TE1484), a historic trash scatter. The archaeological site contains several hundred artifacts. The proposed visitor center and parking location is crossed by at least one abandoned road and shows several questionable open areas with unusual vegetation. In the vicinity of the proposed visitor center and parking lot site there are various berms and pits of unknown origin, though no artifacts were found in a surface survey of these features.

Because of the reconnaissance nature of the archaeological survey cited above, additional research and fieldwork will be needed to determine whether this site is eligible for listing in the National Register of Historic Places. Should this alternative be selected, an intensive archaeological survey will be required to identify possible additional sites and to determine whether these are eligible for listing in the National Register of Historic Places. This survey would be undertaken before any ground-disturbing activity. Should the sites be determined to be significant and eligible for listing in the National Register, consultation with the Wyoming SHPO and Native American governments would be required to determine whether the project constitutes a “no adverse” or “adverse effect.” If adverse, a mitigation plan would need to be developed, again in consultation with the Wyoming SHPO and affiliated tribal governments.

There would be no effect to historic structures in Alternative E. Constructing a new visitor center, administrative building, picnic area, boat launch, as well as rerouting the Moose-Wilson road could impact potentially National Register eligible archeological sites in the area. Following the

guidelines established in the Museum Handbook, there would be no effect to museum objects on exhibit during removal, storage, and reinstallation.

Cumulative Impacts

Park visitation has increased dramatically over recent decades and this trend is expected to continue into the future. As visitation to the Moose area increases, visitor impacts would continue to increase, possibly resulting in the unearthing of artifacts and potential degradation of undiscovered archeological sites. The increase in visitation will have cumulative impacts to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations in the building including temperature and relative humidity.

Conclusion

Possible minor impacts or no adverse effect to archeological sites determined ineligible for listing in the National Register. Possible adverse impact or adverse effect on archeological sites determined eligible for listing in the National Register.

No effect to historic structures since the existing visitor center has been determined ineligible for listing in the National Register.

Minor short-term impacts or no adverse effect to museum objects during the move. Minor impacts or no adverse effect to the sustainability of museum objects on exhibit due to more foot traffic in the building and environmental fluctuations.

The Effects of the Alternatives on the Socioeconomic Environment

Methodology

This assessment of potential socioeconomic impacts is based on an inventory of local and regional conditions relative to the park and park visitation.

Preliminary cost estimates were made using current unit prices for material and work elements. The total expenditures and the effects on the economy under each alternative were compared.

The Effects of Alternative A on the Socioeconomic Environment

Impact Analysis

Local and Regional Economy

Short-term economic benefits from the visitor center rehabilitation expenditures of about \$3,450,000 and construction-related employment would include economic gains for some businesses and individuals in the nearby region. There would be no other change in the type or levels of current impacts.

Visitation and Traffic Patterns

There would be no impact because all roadways and facilities would remain in their existing locations. Visitor use trends would not be expected to change in the short-term. Visitation is expected to continue to increase slightly.

Concessions

There would be no impact because all concessioners would remain in their existing locations and operate under existing guidelines.

Cumulative Impacts

Teton County is the area of concern from the standpoint of social and economic impacts. None of the alternatives would have more than negligible impact in either area. Considering the issues of import within the county, and considering the total economic activity in the county, there would

be no additive impact relative to the visitor center or other possible activities within the scope of this analysis. Social services within the county would not be affected. Actions would not affect incomes, nor add to any existing impacts on minority or low-income populations within the county.

Conclusion

No effect.

The Effects of Alternative B on the Socioeconomic Environment

Impact Analysis

Local and Regional Economy

Short-term economic benefits due to construction related expenditures and construction related employment would include economic gains for some businesses and individuals in the nearby region. Benefits would flow from direct construction related expenditures and the employment of construction workers. In 1999 the total 15.2% of Teton County's economy or approximately \$77,000,000 was related to construction activities. The construction costs for alternative B would create an additional \$9,965,000 or 12%. The effect would be moderately beneficial and short-term on the local economy and a negligible short-term effect on the region or statewide economy.

Indirect benefits would occur as goods and services were obtained from the local area and income wages were spent within the local area.

The local and regional economy, including the town of Jackson and the rest of Teton County would not experience a change in the amount of tourist spending patterns or the amount of visitor spending to occur as a result of any of the alternatives.

Visitation and Traffic Patterns

Negligible short-term adverse effects would be expected on developments within the Moose area during construction activities. These effects would be due primarily to minimal construction delays. However, over the long term, the total number of visitors traveling to the park and to adjacent businesses would not be affected by the construction of new facilities in the Moose area.

Concessioners

Same as alternative A

Cumulative Impacts

Same as A.

Conclusion

Negligible short-term beneficial effects on socioeconomics from construction activities.

The Effects of Alternative C on the Socioeconomic Environment

Impact Analysis

Local and Regional Economy

The relocation of the Moose-Wilson Road at a cost of approximately \$650,000 would have a negligible beneficial effect on the local and regional economy.

The total cost of construction for this alternative would be approximately \$10,535,000. The effects of this alternative on the local and regional economy would be similar to alternative B.

Visitation and Traffic Patterns

Same as alternative B except for the relocation of the Moose-Wilson Road at a cost of approximately \$650,000. This new construction would have a negligible beneficial effect on the local and regional economy. Under this alternative the Moose-Wilson Road would intersect with the Teton Park Road at the Chapel of the Transfiguration. This alternative would direct a percentage of the 6% of visitors that travel on the Moose-Wilson road away from the Moose area. This would have a negligible adverse effect on the businesses of the Moose area.

Concessioners

Without the Moose Village Store, visitors who would like to purchase souvenirs, convenience items or snacks would need to drive to Moose Enterprises. Grand Teton Lodge Company river fishing trips would have to be booked from another Grand Teton Lodge Company location. Local residents, including park employees, would not have the convenience of a store located near the post office. Clustering facilities is convenient for visitors and residents who may want to take care of multiple needs in one location.

Grand Teton Lodge Company reported gross revenue from the Moose Village Store of \$231,586 in 2000. Revenue from guided fishing trips accounted for \$120,000 of that amount. In 1999, the store grossed \$191,000 with \$72,000 from guided fishing trips. Under this alternative this store revenue would not be replaced causing minor short-term impacts.

A greater selection of facilities and services, including gasoline, is available nearby at Moose Enterprises. However, that area is congested and may be less convenient for some visitors. The items for sale at Moose Enterprises may not be consistent with park themes and visitor needs. The service is not subject to National Park Service standards. There is no guarantee that similar services will continue there in the future.

The Jenny Lake Store carries a greater range of merchandise and food items than is currently available at the Moose Village Store and is located 8 miles north on the Teton Park Road. The Jenny Lake Store has a smaller selection of fishing tackle than the Moose Village Store. The Jenny Lake area is highly congested during summer with limited parking. Unless a visitor was planning to spend time in the Jenny Lake area, it would not be practical to stop at the Jenny Lake Store just for convenience items.

Cumulative Impacts

Same as A.

Conclusion

Impacts on the local and regional economy would be similar to alternative B. This alternative would direct a percentage of the 6% of visitors that travel on the Moose-Wilson road away from the Moose area, having a resultant negligible adverse effect on the businesses of the Moose area. Under this alternative this store revenue would not be replaced causing minor short-term impacts to the Grand Teton Lodge Company.

The Effects of Alternative D (Preferred Alternative) on the Socioeconomic Environment

Impact Analysis

Local and Regional Economy

The total cost of construction for this alternative would be approximately \$10,535,000. The effects of this alternative on the local and regional economy would be similar to alternative B.

Visitation and Traffic Patterns

Same as alternative B

Concessions

In this alternative, the retail outlet would be located within the administrative building. This alternative would give visitors the opportunity to make one stop for parking and use of the store and post office. The selection of merchandise, foods service and furnishings would all be to National Park Service standards and complement park themes. This alternative would have negligible economic impacts compared to alternative A.

Cumulative Impacts

Same as A.

Conclusion

The impacts would be similar to those described under alternative B.

The Effects of Alternative E on the Socioeconomic EnvironmentImpact Analysis**Local and Regional Economy**

The total cost of construction for this alternative would be approximately \$10,512,500. The impacts would be similar to those described under alternative B.

Visitation and Traffic Patterns

Same as alternative B

Concessions

There would be no impact on the Moose Village Store because it would remain in its present location.

Cumulative Impacts

Same as A.

Conclusion

The impacts on the economy and visitation would be similar to those described under alternative B. There would be no impact on concessions.

The Effects of the Alternatives on Adjacent LandsMethodology

All available information on non-federal lands in the park has been compiled. In addition, information was compiled on reserved estates on federal lands. These lands were then analyzed to determine the number and location that are located near the project area.

Further analysis revealed that use of the Teton Park Road to access these properties was the key factor indicating whether the project was likely to have impacts. However, landowners and holders of reserved estates that do not utilize Teton Park Road to access their property could be affected through recreational use of the park. These impacts are similar to those on visitors and areas addressed in other sections of this document (Visitor Experience, Visual Quality).

Information was compiled on which landowners are likely to use the Teton Park Road, the types of use that occur on these properties, the distance of the properties from the project area, and how the various alternatives might affect both landowners and/or their property.

The Effects of Alternative A on Adjacent Lands

Impact Analysis

This alternative would continue existing management of the Moose area. Only minor reconstruction activities would take place. The expected duration of construction activities for this alternative is one construction season.

Effects of the no action alternative on adjacent lands are primarily associated with increased traffic levels and sound from motor vehicles. Both the 4 Lazy F and the Murie Ranch are within the limits of audibility of busses and heavy maintenance equipment using the Moose area (see figure 7). If tour bus, snowplow or other maintenance activities increase it would be expected that the sound associated with busses would increase as well.

Conclusion

Alternative A would continue to result in minor effects on adjacent lands. These direct adverse effects would occur as a result of bus and heavy maintenance equipment operating in the Moose area.

The Effects of Alternative B on Adjacent Lands

Impact Analysis

This alternative would have short-term negligible impacts on landowners that use Teton Park Road to access their property, due to possible traffic delays during construction activities. The expected duration of construction activities for this alternative is one-two construction seasons (2 years).

The effects related to the sound of motor vehicles and equipment would be similar to those discussed in alternative A.

Conclusion

Alternative B would result in minor short-term effects on the Murie Ranch and the 4 Lazy F. These direct adverse effects would occur as a result of bus and heavy maintenance equipment operating in the Moose area.

Adjacent landowners would experience some delays on the Teton Park Road as well as a temporary increase in sound levels associated with construction activities.

The Effects of Alternative C on Adjacent Lands

Impact Analysis

Short-term adverse impacts would be similar to impacts outlined in alternative A, but the magnitude of the impact would be higher because this alternative involves significantly more construction, which would occur in several locations on both sides of Teton Park Road. The expected duration of construction activities for this alternative is two-three construction seasons (2-3 years). Short-term impacts would be minor and adverse.

Long-term minor adverse impacts on landowners that use the Teton Park Road to access their property on the Moose-Wilson Road will occur. Relocation of the road 0.6 mile to the west will require these landowners to pass through the Moose Entrance Gate in order to access their property. Impacts will result due to delays when these individuals have to wait in line in order to pass through the gate. Traffic congestion at the Moose entrance gate during the summer causes delays estimated at an average of 5 minutes, increasing up to 10 minutes on peak days. This

congestion is due to the need of gate employees to collect park entrance fees and address visitor inquiries.

In addition, this alternative calls for relocating the Moose Post Office to the area adjacent to the current visitor center. This action would cause a short-term minor inconvenience to residents as they adjust to the new post office location.

Under alternative C the area that busses are audible would increase slightly (see figure 7). The result would be negligible to minor adverse effect on the Murie Ranch when compared with alternative A. The 4 Lazy F ranch would experience slightly less noise from busses when compared to alternative A.

Conclusion

Under alternative C local residents would experience short-term negligible adverse effects from delays at the entrance station that would occur because of the relocation of the Moose-Wilson Road. Residents of the Murie Ranch would experience a negligible adverse effect from an increase in the audibility of busses. Short-term minor adverse effects would result from the associated noise of construction activities.

The Effects of Alternative D (Preferred Alternative) on Adjacent Lands

Impact Analysis

Short and long-term impacts and recommended mitigation would be similar in kind and magnitude to those outlined in alternative B, with the following additions:

Minor adverse direct impacts would occur on residents, guests and staff of the Murie Ranch, a reserved life estate located less than a mile to the south of this alternative. The footprint of the developed zone of the Moose area will expand development towards the Murie Ranch. Current development at the existing post office is approximately 0.6 miles from the Murie Ranch. Under the new alternative, development would expand to within approximately **0.5** miles of the Murie Ranch. Locating the visitor center and handicap/winter parking lot at this location would increase the amount of visitor use and traffic near the Murie Ranch. The level and area of audibility would increase slightly under this alternative. Because of the increase in visitor activity and bus sound minor to moderate adverse impacts on the residents of the Murie Ranch would occur.

Conclusion

The footprint of the developed zone of the Moose area will expand development towards the Murie Ranch. Locating the visitor center and parking lots at this location would increase the amount of visitor use and traffic near the Murie Ranch. Because of the increase in visitor activity and bus sound minor to moderate adverse impacts on the residents of the Murie Ranch would occur.

The effects of construction activities on the Murie Ranch under this alternative would be short-term moderate and adverse.

The Effects of Alternative E on Adjacent Lands

Impact Analysis

Short-term impacts would be similar to those outlined in alternative B.

Long-term impacts associated with the Murie Ranch would be similar to alternative C, due to the proposed construction of a mass-transit center, boat parking, and picnic facility at the existing post office site.

Conclusion

The footprint of the developed zone of the Moose area would expand development towards the Murie Ranch. Locating the visitor center, trail and handicap/winter parking at this location would increase the amount of visitor use and traffic near the Murie Ranch. Because of the increase in visitor activity and bus sound, minor to moderate adverse impacts on the residents of the Murie Ranch would occur.

The effects of construction activities on the Murie Ranch under this alternative would be short-term, moderate and adverse.

CONSULTATION AND COORDINATION

PREPARERS AND CONTRIBUTORS

Grand Teton National Park Study Team

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Greg Kendrick	Cultural Resource Specialist	Cultural and heritage resources
Darin Martens	Landscape Architect	Visual quality
Karin McCoy	Natural Resource Technician	Lands and physical resources
Glen Messersmith	Architect	Park operations and maintenance
Susan O'Ney	Resource Management Biologist	Vegetation, soils and water quality
Joe Regula	Landscape Architect	Visual quality and graphics
Rebecca Rhea	Acting Chief of Concessions	Concessions
Bill Swift	Chief of Interpretation	Visitor Experience and Cultural Resources
Robert Wemple	Engineer	Park operations and maintenance

Agencies/Tribes/Organizations/Individuals Contacted

Federal Agencies

U.S. Army Corps of Engineers, Omaha District

U.S. Department of the Interior, Fish and Wildlife Service, Ecological Services, Cheyenne Office
Michael Long, Field Supervisor

U.S. Department of the Interior, Office of the Regional Solicitor
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State and County Agencies

Wyoming Department of Environmental Quality
Wyoming Game and Fish Department
Wyoming Office of Federal Land Policy
Wyoming Department of State Parks and Cultural Resources—State Historic Preservation Office
Teton County Commissioners
Teton County Planning Office

Affiliated Native American Tribes

Crow Tribal Council
Northern Arapaho Business Council

Northern Cheyenne Tribal Council
Eastern Shoshone Business Council
Shoshone-Bannock Tribes

Private Organizations

Grand Teton National Park Foundation
Grand Teton Natural History Association
The Murie Center
Moose Enterprises, Inc.

LIST OF ENVIRONMENTAL ASSESSMENT RECIPIENTS*

The following agencies, organizations, and groups were sent copies of the Environmental Assessment:

Federal Agencies

Advisory Council on Historic Preservation
U.S. Army Corps of Engineers
U.S. Department of Agriculture, Bridger-Teton National Forest and Targhee National Forest
U.S. Department of the Interior, Fish and Wildlife Service, Cheyenne Office
U.S. Department of the Interior, Fish and Wildlife Service, National Elk Refuge
U.S. Department of the Interior, National Park Service, Yellowstone National Park
Greater Yellowstone Ecosystem Interagency Visitor Center

Affiliated American Indian Tribes

Crow Tribal Council
Northern Arapaho Business Council
Northern Cheyenne Tribal Council
Eastern Shoshone Business Council
Shoshone-Bannock Tribes

State and Local Agencies

Jackson Hole Chamber of Commerce
Teton County Historic Preservation Board
Teton County Library
Teton County Commissioners
Teton County Planning Office
Wyoming Department of Environmental Quality
Wyoming Game and Fish Department
Wyoming Office of Federal Land Policy
Wyoming Office of the Governor
Wyoming Department of State Parks and Cultural Resources - State Historic Preservation Office

Other Agencies and Organizations

Audubon Society
Citizens for Teton Valley
Defenders of the Rockies
Craighead Environmental Research Institute
Grand Teton National Park Foundation
Grand Teton Natural History Association
Greater Yellowstone Coalition
Jackson Hole Bird Club
Jackson Hole Conservation Alliance
Jackson Hole Historical Society and Museum
The Murie Center
The Nature Conservancy
National Parks and Conservation Association
Teton Group of the Sierra Club
Teton Science School
The Wilderness Society
Wyoming Wildlife Federation

*The list of individuals and additional organizations that received the environmental assessment is kept in the project file and is available from the planning office in Grand Teton National Park.

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